BULLETIN

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AMERICAN GEOGRAPHICAL SOCIETY.

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ADDRESS OF PRESIDENT PEARY.

DELIVERED AT THE ANNUAL MEETING OF THE AMERICAN GEOGRAPHICAL SOCIETY, JANUARY 24, 1905.

Our meeting to-night is the first in our second half century, and we enter upon this second half century with a fine home, a valuable library, and a position of financial stability.

We have now the fundamental essentials of equipment.

Our next need is a larger membership, to permit a more vigorous prosecution of our work, and a larger fulfilment of the wide mission for which we were organized. In the effort to secure this, every Fellow who feels an interest in the Society can be of direct assistance.

It should not be difficult for every Fellow to secure an additional Fellow, and send in his or her name for nomination.

It is very gratifying to note that some of the Fellows are doing this now. Such work will most effectively supplement the work of the Council.

Nor can I refrain from inviting the attention of our Fellows to the advantages of enrolling a son or a daughter as a life Fellow in the Society.

To make our influence more widely felt, we need a membership of representative men, covering the entire country. Efforts to increase our Fellowship in this direction will be especially valuable.

I think, also, that we can with advantage form an additional grade of membership in the Society, with similar though more advanced qualifications than those required for our present Life Fellowship.

Such a grade would afford an opportunity which I believe would be utilized by a number of those interested in the work of the Society.

With increased membership and larger income, I hope to see a definite exploration fund established, to be expended with the approval of the Council, under the direction of an advisory committee.

It is for us to *initiate* as well as urge, encourage, and approve work in our field. No matter how much or how valuable work a geographical society may do in other directions, if it fails to accomplish actual work of exploration it fails to exercise its full functions.

In a social direction we can extend our influence advantageously, and solidify our membership, by an annual dinner or reception, or both, during the winter; and by an appropriate meeting during the summer.

Next season a series of informal illustrated talks in our own auditorium, alternating with our stated monthly meetings in Mendelssohn Hall, could be made instructive and interesting, and would form an agreeable and valuable intermediary between the social and scientific phases of the Society.

In connection with our medals, the capacity of our Society for encouraging geographical work would be distinctly enhanced if we had one or two second-class medals available for award to travellers, explorers, or other workers in the domain of geographical investigations who have accomplished good work and yet whose work is not of a magnitude or importance justifying the award of either of the two great gold medals of the Society.

No large sum would be required either for the initial cost of such medals, or to provide for their annual award.

The Geographical Work of the World in 1904.

The most salient geographical event in this country during the past year was the meeting of the Eighth International Geographic Congress in September.

This was the first meeting of the Congress in this country, and the assembling of many eminent geographers from the principal countries of the world has resulted in a pronounced stimulus to geographical work and interest here.

It is impossible to attempt even a summary of the work of the Congress.

Four commanding resolutions were passed by the Congress, as follows:

(1) Urging upon the attention of geographers the mapping of

the world on a scale of 1:1,000,000, as proposed by Prof. Penck, of Vienna, at the Sixth Congress;

(2) Approving polar exploration, and commending north polar work to this country, proposed by Sir John Murray;

(3) Appointing a committee to consider a world census;

(4) Regarding methods in oceanography.

UNITED STATES.

In the United States the work of the Coast and Geodetic Survey and the Geological Survey is being carried on steadily. The extent of this work is such as to make it impossible to note it here. The annual reports of these surveys contain it in full.

An interesting map in Bulletin 201 of the Geological Survey, shows the extent to which our wide territory is now brought under survey control by astronomical positions and primary triangulation.

Another subject of much importance to the West is the reclamation of our arid regions. A reconnaissance survey for this purpose was commenced in 1888. The reclamation service was organized in 1902, and work was commenced in 1904.

The projects approved, for which funds are assigned, contemplate the reclamation of some two million acres—an area nearly equal to that of Delaware and Rhode Island combined. Other projects for future consideration cover millions of acres additional. The funds for this work are obtained from the sale of public lands, and these funds amount at present to some twenty-three million dollars.

An idea of the meaning and value of this work may be gained from the fact that land reclamation in the Nile Valley is estimated to have added some three hundred million dollars to the valuation of Egypt.

The origin and character of these reservoir surveys are described in the twentieth annual report of the United States Geological Survey, Part 4.

The Geological Survey has recently begun the resurvey, on a larger scale, of a number of mining districts, the present stage of development making more detailed maps necessary in the transfer of property and other details of business.

Another problem affecting wide and large interests, and one that bids fair to be perennial, is the control of the Mississippi.

The Statistical Atlas of the United States, issued by the Twelfth Census, is worthy of note, and is unique in its completeness and convenience.

Coming nearer home, the Barge Canal across New York State is a project of great interest to this city.

With a length of 350 miles, an estimated cost of 101 million dollars, capacity sufficient for one thousand ton barges, and an estimated annual tonnage when opened of 10 million tons, this canal is the largest project yet undertaken by any State.

It ranks greater than the great foreign ship canals of Manchester, Kiel, and Corinth. It is comparable in estimated cost and traffic to the Suez Canal, and is second only to the canal at Panama, of which, when completed, it will be a direct feeder, *via* New York City.

There is food for thought for the residents of New York City, in the investigations of Mr. Tuttle, indicating that since 1875 the coast in this neighbourhood is sinking at the rate of 1½ feet in a century.

ALASKA.

Turning to Alaska, it is but little more than a year (October 20, 1903) since the final adjustment of the Alaskan Boundary Question. It is not necessary to go into the details of this. The decision reached by the Tribunal was satisfactory to this country, and the adjustment removed a source of irritation between the United States and Great Britain which had existed for more than thirty years.

Another important step in Alaskan progress is its connection with the United States by cable during the year, and the extension of the telegraph and wireless lines in the country. The system comprises 2,079 miles of cable, 1,439 miles of telegraph, and 107 miles of wireless line. Some of the cable is laid in a depth of 1,700 fathoms.

A cable or wireless line across Bering Strait, and 1,500 miles of telegraph in Siberia, would connect Asia with America.

As regards the mapping of Alaska, the map of that region, on a scale of 39 4/10 statute miles to an inch, which will be issued soon by the United States Geological Survey, will mark a turning-point.

The surveys of northern Alaska by Messrs. Peters and Schrader, published in the Geological Professional Papers, Number 20, 1904, carried a belt of scientific exploration through central Alaska to the Arctic Ocean.

Mount MeKinley, the culminating-point of North America, remains still unconquered. Dr. F. A. Cook, one of our Fellows, attempted its ascent, and, though he did not reach the summit, he attained the height of 11,400 feet, and made the entire circuit of

the mountain. It is reported that another attempt is in contemplation for next summer.

NORTH AMERICA.

North of us, the Canadian Geological Survey is continuing its work, largely in the Yukon District.

The Canadian Government has been active in exploiting its Arctic domain during the past eighteen months, though more in a political and commercial than a geographical mood. The *Neptune*, chartered for the purpose, wintered in Hudson Bay, and visited the northern lands as far as Cape Sabine, 78° 42′ N. Lat. The *Gauss*, purchased from the German Government, is now engaged in the same region.

The Government is continuing current observations along the southern and eastern shores of Newfoundland.

These activities are largely due to their bearing on the cherished project of a short northern sea route *via* Hudson Bay to Canada's great western grain country.

South of us, in Martinique, the aftermath of the Mont Pelé catastrophe, the so-called obelisk, and other phenomena continue to attract the interest of scientists and geographers.

SOUTH AMERICA.

In South America we have a continent which in wealth of natural products, in capacity for development, in possibilities for the future, equals, and perhaps surpasses, Africa.

That there is not the same activity there as in Africa is due to the smallness of the population (South America being the least densely-peopled of any of the continents) and the fact that the territory has for a long time been all pre-empted.

A new boundary between Brazil and Bolivia was established by treaty on December 28, 1903, amounting practically to the purchase by Brazil of some 73,000 square miles of valuable rubber territory for $10,000,000 and other valuable considerations, and thus the long dispute over the possession of the large territory known as the Acre was finally adjusted.

This was a question concerning the great rubber centre of the world, this region of southwest Amazonas, owned by Brazil, Bolivia, and Peru, and furnishing nearly two-thirds the total output of the world, valued at about $100,000,000.

Explorations are continuing in Peru, Bolivia, and Brazil, Chile and Argentina, more particularly in connection with developing the capabilities of the rivers and exploiting their valleys; and in

settling and defining boundary questions, which, as rubber and other natural sources of wealth become known and accessible, become of great importance.

Another boundary dispute, that between Brazil and British Guiana, was settled in June last by the King of Italy as arbitrator.

In connection with the boundary surveys to determine the frontier between Argentina and Chile attention may be called to Sir Thomas Holdich's interesting and valuable work on "The Countries of the King's Award."

Professor Hans Meyer has been studying the glaciation of the Ecuadorian Cordilleras, including Chimborazo, Cotopaxi, Antisana, and other peaks, with gratifying results.

The geodetic work in Ecuador, under French observers, is still being carried on, comprising triangulation, levelling, and some pendulum observations.

In Bolivia the French Expedition under MM. Créqui-Montfort and De la Grange has made surveys and studies of Lakes Titicaca and Poopó.

A Government report gives eight routes over the Andes in Peru. On one of these (The Oroya R.R.) the summit elevation of 15,680 feet is the highest in the world.

An interesting project is the Pan-American Railway, the great north and south trunk line, which, in connection with existing railways, will form a continuous all-rail route from New York to Buenos Aires, a distance of 10,471 miles. Of this distance, 7,162 miles are already completed, leaving some 3,309 miles, in various detached sections, yet to be built. This is one of two great north and south rail-routes (one in each hemisphere) now attracting attention. Hitherto the great all-rail routes of the world have been following parallels of latitude; in other words, running, in general, east and west. Now they are beginning to follow meridians.

EUROPE.

Geographical work in Europe is of necessity one of detail and careful scientific development, including the minute study and classification of coast-lines; the determination of changes and their causes; studies of former glaciation limits; studies of the movements of sand-dunes; of the exact limits of tree and other vegetation; earthquake observations; meteorology; tree-planting, etc.

Limnology, the detailed study of lakes, has been general, and is an interesting branch of investigation, Work in this direction has been carried on in Scotland, Switzerland, Hungary, Italy, Prussia,

and Russia. No better examples of this work can be given than the bathymetrical surveys of Sir John Murray on the Scotch lakes, and the similar work of Forel in Switzerland.

In Austria continued earthquake observations show the frequency of shocks to be less during the past year than in any previous year. It is interesting to note that in Austria is the only double seismological station—*i.e.*, one at the surface and another 3,600 feet below in a mine-shaft.

In Russia pendulum observations carried on for the past five years are giving valuable results.

A report on Belgian Waterways gives one mile of these for every eight and a half square miles of territory. Eighty per cent. of these waterways are directly controlled by the State, and an average of three and a half million dollars annually have been expended upon them for the last twenty-five years.

Partsch and other explorers have been studying the glaciation of the Carpathians and neighbouring mountains with interesting results.

The Survey Atlas of England and Wales is one of the most conspicuous cartographic works yet carried out, and is based on the British Ordnance Survey recently completed, the most exhaustive survey as yet made by any country.

ASIA.

In Asia, the greatest of the world land-divisions, including as it does the so-called "Roof of the World," the two regions of special interest are the plateau of Tibet and the Himalayas; and the northern coast of the continent bordering the Arctic Ocean. Tibet and Lhasa, the hitherto mysterious portion of Asia, are now, as the result of the English expedition to that country, no longer a mystery—are no longer forbidden. The Workmans have been busy in the Himalayas; Profs. Davis and Pumpelly and Mr. Huntington have been doing work in central Asia to the southwest of Tibet. About Lake Issik-Kul, Prof. Davis and Mr. Huntington found conditions reminding them of our Salt Lake region in Utah. Our Mr. Nichols penetrated to within nearly a hundred miles of Lhasa, only to meet his death from pneumonia.

The long-standing controversy as to Mts. Everest and Gaurisankar has at last been settled, with Mt. Everest proved not to be identical with Gaurisankar, with which it has so long been confused.

The Russian Caspian Sea Expedition should promise valuable results, but no recent news has been heard in regard to it.

Our American traveller, Mr. Oscar T. Crosby, has made a journey in Turkestan and across the northwest corner of Tibet.

The results of the Russian expeditions to Lake Balkhash and Kosso-gol and examinations of the Sea of Aral, indicate that these bodies of water in central Asia are rising, showing in this a marked contrast to some of the lakes of Africa, which for years past have been gradually contracting.

Turning to the Arctic coast, we find a railway project under consideration from the mouth of the Obi River to the vicinity of the Gulf of Pechora, to obviate the difficulties of ice-navigation through the Kara Sea, and enable the commerce brought down the great Russian rivers to be transported to Europe by the less uncertain voyage through the White Sea.

Surveys are also being made along the Murman coast; and it is perhaps possible that later, after peace has been declared in Asia, the entire matter of the Northeast Passage, which within the last year attracted some attention as a possible route for a fleet from European to Pacific waters, may be investigated thoroughly throughout the entire extent of coast which thus far Nordenskjöld is the only navigator to have traversed.

AFRICA.

Of all the great world-divisions the one in which there is to-day the greatest activity (though in the line of development rather than exploration, for the latter is largely a matter of the past), and the one which possesses largest interest, is Africa.

Portioned out as it is among the principal European nations, each one's parcel serving as a market for its products, and perhaps in the future a home for its surplus population, we see going on there simultaneously and with great activity, and on a large scale, under a diversity of national and racial methods, the processes of development, of civilization, of empire and commerce building.

In this continent only two explorations on a large scale were carried out or reported on during the past year. One of these is Chevalier's expedition and the important discovery of the phenomena of desiccation now in progress in the Central Sudan.

The other is Lenfant's journey in the Lake Chad region, in which he proved the existence of water connection during the rainy season between that lake and the Atlantic Ocean *via* the Niger system.

Long journeys of exploration in Africa are now supplanted by more detailed studies in small areas, and these studies are constantly improving our mapping of Africa.

The British have completed the detailed survey of their coast of the Victoria Nyanza, the northern half of the shores of the Lake. The German surveys are in progress along the southern coasts; and when these are completed, we shall have a detailed map of all of the shores of the Lake, and the best map of the Victoria Nyanza will have been produced.

One of the most significant features of the development of Africa is the sinking of artesian wells by the French Military Department of the Sahara, to secure water for the irrigation which is now being extensively carried on in the Algerian Sahara and, to some extent, in the desert farther south.

It has been known for years that wide areas of water underlie the desert surface. All the oases lie in depressions of the surface, so that the water in some places comes to the top and in other places it may be reached by digging.

It is asserted by the French officials that the areas which may be reclaimed will probably support a population of 1,000,000. It has been satisfactorily proved that these waters come from the slopes of the Atlas Mountains in the north and from the Ahaggar and other ranges of the Central Sahara, which are favoured with regular summer rains. The water sinks to impermeable rock strata and makes its way for long distances under the desert surface.

Attention has been attracted during the past year to the rapid progress of Saharan exploration by the new methods of desert travel introduced by the French.

Up to two years ago French caravans used the ordinary slow camels of the desert, heavily laden with food and water supplies, and ammunition and guns for defence against the Tuareg nomads. The French found that the Tuaregs, who always escaped after their forays, picked their camels and trained them so that they cover from two to three times as much ground in a day as the ordinary pack camel.

The French enlisted the best camel-drivers of the north, ransacked all the camel herds of the Algerian Sahara, and trained selected animals to get over the ground with a lope that leaves the ordinary caravan train far behind.

The French army of the Sahara now carries no baggage train; but each camel is lightly loaded with supplies, the parties replenishing their commissariat at the oases they reach. The Tuaregs, being unable to escape from these expeditions, have been so severely defeated in their homes among the Ahaggar Mountains that they are no longer a serious menace to desert commerce.

The French, within the past two years, have sent swift expeditions to the Ahaggar Mountains in the south and far towards Timbuktu in the southwest, finding new sources of pasturage and water supply and making other interesting discoveries.

The growth of railroad-building in Africa has been rapid since 1890, and there are now about 14,250 miles in operation. The railroad to Victoria Falls on the Zambezi has been completed, and there is now a direct route from Cape Town to Victoria Falls, 1,644 miles. A permanent hotel is now being built at the Falls, which are more than twice as high as Niagara and a mile in width, affording a scene of wonderful beauty and grandeur, which cannot be observed, however, in its entirety, from any one point of view.

This is the place where the British Association for the Advancement of Science will hold its annual session this year, the first great scientific body to meet in Central Africa.

The French have completed their railroad in Senegal from the head of navigation on the Senegal River to the Niger River at Bammako. During the season of high water in the Senegal there is, therefore, now steam transportation from the Atlantic Ocean for about 600 miles east to the Upper Niger.

Trains have for several years been running regularly between Wady Halfa on the Nile and Khartum in the Anglo-Egyptian Sudan; but Khartum will soon have a more convenient outlet to the sea. Work on the new railroad is now in progress at both ends, along the old caravan route between Berber on the Nile, and Suakin, the best port on the Red Sea; and when it is completed Khartum will be separated from the sea by only 470 miles of rail routes.

Another important project is that between Stanleyville and Ponthierville on the Upper Congo, only 75 miles long, but circumventing the rapids which obstruct navigation above Stanleyville. Four thousand Congo blacks and 170 whites are now building this road, which will be completed about the end of the present year. There will then be uninterrupted steam transportation by rail and river from the Atlantic, 1,640 miles up the Congo.

The so-called "Cape to Cairo" railway project will, when it materializes, traverse Africa from north to south, connecting Cape Town with the Mediterranean by a rail route of some six thousand miles.

Existing railways in Egypt and South Africa furnish an available mileage for something over half this distance.

The past year has witnessed the beginning of colonizing experiments among the highlands of East Africa. Several hundred colo-

nists from Great Britain have settled on the Kikuyu plateau south of Mt. Kenia, about 6,000 feet above the sea, where they are opening farms and lands allotted to them by the Government.

These places are among the portions of tropical Africa that are destined some day to become centres of white industry and civilization.

AUSTRALASIA AND THE PACIFIC.

In Australasia and the Pacific it is interesting to note that the new Pacific cables are being used to revise Pacific longitudes.

In Tasmania recent investigations give indications of ice-sheet glaciation at low altitude in a latitude similar to that of Madrid.

The ownership of Marcus Island in the Pacific, at one time in dispute between Japan and this country, has been settled in favour of the United States.

OCEANOGRAPHY.

In the realm of the oceans (whose area is nearly three times greater than that of the land), where the observer gropes his way blindfolded, the field has only begun to be exploited, in spite of the work of Sir John Murray and others, and no one knows what undiscovered deeps may yet be found, what unknown forms of life may be brought to light.

In this field the Admiralty Expedition to the Indian Ocean, for the purpose of carrying on surveys there on the plan of the *Challenger* Expedition, is of conspicuous importance.

ARCTIC REGIONS.

Turning now to the extremities of the earth, the Polar regions, it is my sad duty to note in the Arctic the death of Baron Toll, who started from the New Siberian Islands, south for the mainland with his drivers, and has not been heard from since.

Amundsen, in his little craft "Gjöa," is, according to a letter reported to have been found by a whaler on Beechey Island, somewhere in the waters of Lancaster Sound, in his search for the magnetic pole.

The Danish expedition which crossed Melville Bay and spent the season among the Eskimo of Whale Sound, where they were seen by the whalers, retraced their steps on snow-shoes across Melville Bay to the Northern Danish settlements, and returned home.

Mr. Ziegler's expedition under Mr. Fiala is still in Franz Josef Land, though no news has been received from it, the attempts to communicate with it last summer having been rendered abortive by the heavy character of the ice.

Mr. Ziegler has recently purchased the *Terra Nova*, one of the relief ships of the British Antarctic Expedition, for a relief ship for next summer, when the Fiala party will undoubtedly be reached and brought home. There is little reason for anxiety in regard to them, as they were amply provisioned, and the fact of their non-return last summer does not necessarily mean anything serious.

The proposed expedition of the Peary Arctic Club of this city is probably familiar to most readers. The new ship for this expedition is now being built at Bucksport, Maine, and, when completed, will be the most powerful ship yet constructed for Arctic navigation and discovery. It is proposed that the Club's expedition shall start north next July.

In France, M. Bénard and the Prince of Monaco are considering an expedition which shall utilize the drift method of approach to the Pole. This plan contemplates two ships entering the ice farther to the east than did Nansen, and thence drifting over or near the Pole.

ANTARCTIC REGIONS.

In Antarctica the year has been marked by the return of all of the expeditions which, during the past two or three years, have been emulating each other in securing additional information in regard to the lands and seas surrounding the South Pole.

The efforts of these expeditions from Great Britain, Germany, Sweden, and Scotland, have made the past three years an era of unusual activity in Antarctic work.

Briefly summarized, the British Antarctic Expedition in the *Discovery*, under Captain Scott, utilizing the Victoria Land of Ross, south of New Zealand, and wintering two years under the shadow of Mt. Erebus, attained by far the highest southing, 82° 17′ S. Lat., and saw mountains extending to 83° S. Lat.

The German expedition in the *Gauss*, under Dr. Drygalski, discovered a new point in the periphery of the Antarctic Continent, near the Antarctic Circle, and during one season made valuable biological collections and magnetic and meteorological observations.

The Swedish expedition in the *Antarctic*, under Dr. Nordenskjöld, had the misfortune to lose its ship, but the party wintered on islands of the Graham Land group, south of Cape Horn. The expedition was out two years, and the discovery of a fossil flora and fossil bones of mammals opens up a new horizon in Antarctic investigation.

The Scottish expedition, under Mr. Bruce, in the *Scotia*, made

two voyages in successive seasons, and has located one more point in the circumference of the south polar land, east and south of the Graham Land group.

There remains now in that region only the French expedition, under Dr. Charcot, which sailed last summer.*

As far as I am aware, it is not the present intention of these various nations to continue exploration in that region, the *Gauss*, *Terra Nova*, *Morning*, and *Discovery* having been sold, and the *Antarctic* lost.

An unusually favourable opportunity is, therefore, presented for this country to take up the work where it has been left, and, profiting by the experience and discoveries of our friends across the water, and utilizing methods and equipment which we have ourselves developed in recent years of Arctic work, carry the problems of Antarctic exploration and discovery to their legitimate conclusion.

Prof. Penck, in his summarization of the results of these various expeditions, notes that present indications point to a *seventh continent* about the South Pole, with an area equal to that of Europe, and an interior presenting conditions similar to those of Greenland.

Such a land-mass with such an interior, would present ideal conditions for the utilization of methods of ice-travel, developed in the north during the past twelve years, and would almost insure that a properly-equipped two-ship expedition sent out from this country, would attain the South Pole itself.

THE UNKNOWN.

I have touched briefly upon the work of exploration and development now going on in the world. Our maps have made us familiar with the known portions of the earth; let us look for a moment at the unknown portions. Comparatively few, it is true, and steadily decreasing, but still existent. Areas in every continent but Europe.

It is only at the Poles that great areas still remain absolutely unknown to the explorer and scientist, and the popular conception of these regions is almost as far from the truth as were the ideas of the early Phœnician navigators in regard to the terror-haunted regions beyond the Pillars of Hercules.

About the North Pole is an area of approximately 3,000,000 square miles—roughly speaking, of the size of the United States or Australia or Brazil; while round the South Pole is an area nearly three times as large—larger than South America.

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* Dr. Charcot's Expedition returned to Argentina March 5. The winter was passed in work in Palmer and Graham Land, south of Cape Horn.—R. E. P.

These regions stand to-day as a challenge and spur to every geographer, to every geographical association, and to the man in each of us.

Dr. Hugh Robert Mill, one of the foremost British geographers, in a recent able address on the "Present Problems of Geography," says:

> To begin with, the ground should be cleared by wiping off the globe the words "terra incognita." Such unknown parts of the earth now cling about the Poles alone, and that they should even do this is something of a disgrace.
>
> The other residual problems of exploration and survey are in the same case. If those who control money saw it to be their duty to solve them, they would all be solved.

I most heartily endorse Dr. Mill's statements.

In the coming chapters of this record of achievement and progress and growth let us hope that our Society will be in the front rank.

Remembering its initiation and urging of the work of a State survey in the past, the Society can repeat that action on a larger scale by urging upon the National Government the desirability of taking up Antarctic exploration where our friends across the water have left it and, profiting by their experience and results, pushing it to a splendid conclusion, and enriching our museums and our studies with a mass of new and valuable material from that yet practically unknown region.

Such a project could be urged by none better or more appropriately than this Society—and it could be urged with more than ordinary chances of success. Such action is not only the privilege but the duty of a Society such as ours, and there is no present project of larger or wider geographical interest than the one I have indicated. At the Poles alone to-day is it possible to do great pioneer work in geography.

There is another thing which, while it may seem to some an impracticable dream, is not so, and which I should like to see realized —namely, that this Society, located in the maritime centre and largest city of the Western Hemisphere, should possess a ship of its own, not large, not expensive, but capable of floating the Society's pennant in any sea on the globe.

There is no other one way in which we can more effectively take lead among geographical societies, and widen the boundaries of information in our field, than by having such a ship of our own, which, every year, under the direction of the Society, should carry on original scientific investigations in some quarter of the globe.

As I have stated, such a ship need not be expensive, and it would be possible to reduce the cost of maintenance to a nominal sum.


280
290
300
Trinidad
Rio Orinoco
Venezuela
Georget
Guia
R. Negro
S. Joaquim
R. Yapura
Ecuador
R. Iça
Manãos
Solimões
Iquitos
Leticia
Maranhão
Yurimaguas
Rom Fim
Mazary
Tarapoto
Fortaleza
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Peru
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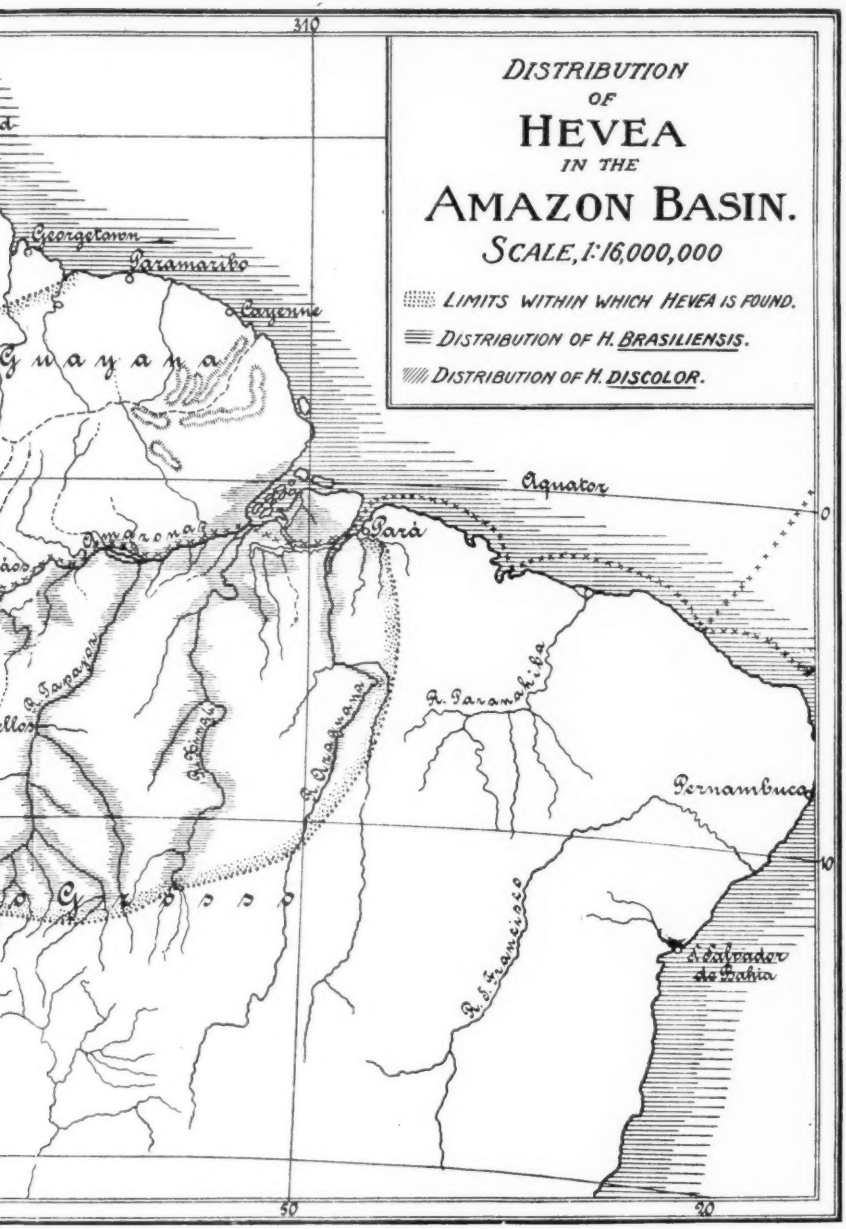
DISTRIBUTION
OF
HEVEA
IN THE
AMAZON BASIN.
SCALE, 1:16,000,000
LIMITS WITHIN WHICH HEVEA IS FOUND.
DISTRIBUTION OF H. BRASILIENSIS.
DISTRIBUTION OF H. DISCOLOR.
310
Georgetown
Paramaribo
Cayenne
Guayana
Equator
0
Amazonas
Pará
R. Tapajos
R. Tocantins
R. Araguaya
R. Paranahiba
Pernambuco
10
R. S. Francisco
S. Salvador
da Bahia
50
30

Two other matters are well worth our serious consideration—namely, co-operation with the commercial interests of this great city, and co-operation with the Government in its rapidly-expanding geographical interests. In these two directions lie broad avenues, by which we may continuously and permanently make our vigorous impress upon the geographical and commercial work and thought of the country.

RUBBER IN THE AMAZON BASIN.

The map printed herewith is taken from the "Beihefte zum *Tropenpflanzer*" (No. 1, Jan., 1905), the monthly published in Berlin by the Kolonial-Wirtschaftliches Komitee. This periodical covers the increasingly important field of tropical agriculture. Each number contains the results of agricultural experiment stations and reports of progress from all parts of the torrid zone, treating the German colonies with especial fulness.

The present supplement of 71 pp. gives the report of Mr. E. Ule's expedition in 1900–03 through a large part of the rubber territory of the Amazon Basin. His purpose was to study the methods of collecting rubber and the conditions of the rubber trade at the largest source of supply. His journeys took him from Pará up the Amazon and Marañon Rivers to the western line of rubber production on the eastern slopes of the Cordilleras. He ascended the Rio Negro, the great northern tributary, for over 300 miles, and made long journeys up some of the southern affluents and their tributaries, the Madeira, the Giparaná, the Juruá, and the Huallaga. His map shows the distribution of *Hevea*, which supplies the most valuable rubber exported from South America. *Hevea Brasiliensis* is the source of Pará rubber.

The distribution of rubber plants, especially *Hevea*, extends through the Amazon Basin to the Guianas and southern Venezuela. The southern half of the basin yields most of the product. Here the *Hevea Brasiliensis* thrives, the larger part of its output now coming from the Madeira, Purús, and Juruá Rivers. *Hevea Discolor*, characteristic of the black water rivers of the basin, is also important in trade. Mr. Ule describes eleven other varieties of *Hevea*, most of which have little importance in the rubber trade, though some of them are used to mix with Pará rubber.

There are no rubber forests on the Amazon as we would speak

of oak or pine forests. The rubber trees are scattered among other kinds of timber, and form only a small percentage of the trees. The whole basin, especially the southern part of it, is covered with limitless forests, with only here or there a campo or plain of comparatively small extent.

The methods of collecting rubber from the *Hevea* and the *Castilloa* have been briefly described in the BULLETIN (Vol. XXX, pp. 275–276). The reader who desires exhaustive details is referred to Mr. Ule's pamphlet. In brief, the rubber-collector can care for about 200 *Hevea* trees, collecting sap from half of them on one day and from the other half on the next day. The season covers the drier months, from May to October. Every morning the workman goes from tree to tree, making short incisions with a small hatchet. Under each incision he presses the sharp lip of a tin cup in which the sap is caught. The wound soon heals, and *Hevea Brasiliensis* yields annually for four or five years, when the tree is given a year's rest.

Castilloa, which yields caucho or caoutchouc, is also widely distributed, but there is danger of its being exterminated, as the tree is destroyed in order to obtain the milk.

The transportation question is very important. On some of the smaller rivers rubber cannot always be transported, even by canoe, and it is necessary for men to carry the loads on their backs for short distances. But the product is carried to great trading-points like Manaos and Pará only by steamboat, and there is regular steam traffic on all the larger rivers where rubber-collecting is important.

Manaos is the collecting-point for the central and upper basin, while the rubber of the lower river and its two great tributaries, the Tapajoz and Xingú, is tributary to Pará. In 1880 the total rubber yield of the Amazon Basin was only 8,680 tons. Ten years later the product had almost exactly doubled; and in 1900, 8,937 tons were shipped from Manaos and 17,812 tons from Pará, or 26,749 tons from the Amazon Basin in a total world product of 51,001 tons. It was not till 1901 that the development of rubber-collecting along the great rivers tributary to Manaos enabled that city to surpass Pará in quantity of rubber prepared for market. Since that time Manaos has kept well ahead of Pará in this trade. In 1903 the exports from Manaos were 18,277 tons; from Pará, 12,817; from the Amazon Basin, 31,094 tons, or more than half of the world's product, the total output being 61,759 tons.

For the five years ending with 1903 the annual yield of caucho, or rubber, from the *Castilloa* amounted to from 3,247 to 3,906 tons,

while the production of rubber from *Hevea* varied from 13,469 to 16,546 tons.

The central and upper Amazon Basin are now the most important fields of rubber production. It is interesting to observe the relative importance of the various rivers in production. In 1903 the upper Amazon, with the Javary and the streams above Iquitos, yielded 4,130 tons; the Juruá, 4,537; the Purús, 7,395; the Madeira, 2,963.

Various attempts have been made along the Amazon to form plantations of *Hevea* trees. These experiments have not been very successful, and the fact has been chiefly ascribed to the comparatively high price of labour and the inability of the planters to give adequate care to the young trees. There seems to be no doubt, however, that rubber trees may be successfully raised on Brazilian plantations. Experiments show that a tree of *Hevea Brasiliensis* in a well-kept plantation will yield within fifteen years after planting, while a tree in the forest requires twenty-five years.

The fact is now well known that many comparative experiments in tropical countries with some or all of the established rubber plants have demonstrated the superiority of *Hevea Brasiliensis*. One of the latest accounts is from Mr. W. H. Johnson, Director of Agriculture on the Gold Coast, West Africa, who reports that experiments in the botanic gardens at Aburi were unsuccessful with West African, Ceará, Assam, and Central American rubber plants. Fairly satisfactory results were obtained with the indigenous *Funtumia elastica;* but *Hevea* excelled in quantity and quality of rubber and in its rate of growth, and has been remarkably free from insects and fungus pests.

TOPOGRAPHY AND TRAVEL IN PENNSYLVANIA.

BY

WALTER S. TOWER.

The earliest lines of travel in Pennsylvania, Indian trails, and tracks through the wilderness took little heed of surface form. On the old maps many trails may be seen running directly across steep mountain ridges and through deep valleys, with no apparent attempt to seek out the easiest routes. To-day the more improved modes of travel seem to be less independent. Throughout the State, both highways and railroads are directly controlled by the topographic conditions of the region.

Pennsylvania may be divided, on the basis of general features, into three main topographic districts, each one quite different from the others, and together presenting a variety hardly equalled in any other State. The three districts are: (1) the southeast district, a region of small relief; (2) the central district, a region of parallel ridges and linear valleys; and (3) the western district, a region of many streams and steep-sided valleys, with intervening even-topped hills. When each of these districts is considered in detail it is seen that as the topography varies the conditions of travel also vary.

The southeast district includes the area south and east of South Mountain, together with the region lying between South and Kittatinny or Blue Mountain, commonly known as the Cumberland or Great Valley. In comparison with the rest of the State, this district is a region of small relief; it is not a plain, however, in the strict sense of that term, being characterized throughout by a rolling topography of varying altitudes. When studied in detail there appear to be three divisions of the district: (1) The lowland areas, represented by the Great Valley, the Chester Valley, and the Lancaster plain; (2) the extreme southeastern belt of low hills in Philadelphia, Delaware, and Chester Counties; and (3) the range of hills known as South Mountain, extending from the Delaware River at Easton southwestward to Reading, where they die down not to appear again until the Susquehanna River is passed in York and Cumberland Counties. In each one of the smaller divisions the topography is characteristic and exerts its controls over travel.

Throughout the Great Valley, the Lancaster plain, and the other lowland areas the surface is that of a gently-rolling or undulating plain; streams are many, but there are no deep valleys, and though the surface is far from level, hills of any prominence are few and scattered. Over such a region travel moves with equal facility in all directions. The highways often present a rectilinear pattern, being parallel to, or at right angles to, the undulations. They usually represent the shortest distance between the different points of communication, and over a given area they reach a maximum value of mileage, averaging even in some of the less populated parts two and three miles of highways per square mile of area. Railroads, likewise, find nothing to restrict their direct routes. There are few steep grades to be climbed, few cuts to be made, and few valleys to be bridged. The several lines radiating from Lancaster, from New York, or from Lebanon all show the freedom of communication which exists.

In the area of low hills beginning to the north of Philadelphia

and extending southwest into Chester County there are no great elevations, the relief rarely exceeding 200 to 300 feet; steep slopes and cliffs are generally absent, and the whole contours take on a softened, rolling outline. The conditions are much like those in the lowland areas. Travel by highways is unrestricted; no slopes are so steep as to be forbidding, and no heights are so great as to make detours easier or more economical. Away from the larger towns there are often two or three miles of road per square mile of area. The railroads, however, find the conditions a little less free. Where convenient stream-courses offer easy grades along their banks, the railroads follow the streams, as in the case of the two main lines along the Schuylkill, and the smaller lines along Darby, Chester, and Brandywine Creeks. The main line of the Pennsylvania Railroad, however, finds it more economical to save distance even at the expense of numerous cuts and bridges, and hence runs out across country to the level region of the Chester Valley.

In the South Mountain belt there is not, as in the case of the other mountains of the State, a solid, steep-sided, even-crested wall of rock, but rather a broken chain of detached hills of varying height and extent. Few of them are continuous elevations for more than a mile, being generally rounded rather than linear, and few of them rise more than 600 or 700 feet above the level of the surrounding country. The control of travel is more marked here than in the other two areas. The highways can, and in many places do, run across country, irrespective of the hills that intervene, but by far the greater number of them swing around the hills, keeping to the lower levels and seeking the lower divides, even at the expense of greater distances to be travelled. The relief is great enough to make many routes impossible for the railroads. The degree to which the country is intersected by streams results in there being no continuous, easy slopes, except along the winding-stream valleys; and in them the railroads are compelled to locate. In the fifty miles from Easton to Reading the South Mountain belt is crossed but twice by the Bethlehem and Allentown branches of the Reading Railroad, both of which are single-track lines, and are compelled to follow up the creek to cross over to another descending on the other side. On the Allentown branch a tunnel a half mile long is necessary to get from the headquarters of the Perkiomen to the valley of Little Lehigh Creek.

In the same way the south prong of the South Mountain, in

York and Cumberland Counties, is crossed but once in its extent of forty miles in this State by the road from Carlisle to Gettysburg, which follows up the valley of Mountain Creek to descend on the south by the valley of the Conestoga. Thus, in the southeast district there is the open communication of the Great Valley and the lowland areas; the beginning of restriction in the southeastern belt of hills, and the still greater restrictions in the South Mountain belt.

For the sake of direct comparison, let us pass next to the western district, which may be considered as including all the area west and north of the Allegheny Mountains. In this district the relief is everywhere great, and though the hills, viewed from a distance, present the effect of a generally uniform level, the difference between the upland level and the valley bottoms is often 1,500 feet. The slopes are often steep; cliffs are not infrequent, and many of the valleys are of the character of narrow, steep-sided, V-shaped ravines. The streams and their tributaries are numerous and ramified, which, together with the narrow character of the valleys, results in there being neither continuous stretches of unbroken upland nor extensive areas of lowland. Though the conditions of actual elevation above sea-level, amount of relief, etc., vary here and there in the district, the controls of travel are so similar throughout that it may be regarded as a unit.

The first interesting feature is the control exerted by the Allegheny Mountain, the eastern boundary of the district. The Allegheny Mountain, which is really only the southeast-facing escarpment of the plateau lying to the west, extends almost unbroken in a long, sweeping curve from the Maryland line in Somerset County to within twenty miles of the northeast border of the State. It is a wall of rock about 2,000 feet high, and in its extent of 230 miles in this State it is broken only by the narrow gorges of long cañons, through which flow the northwest branches of the Susquehanna River. These branches are six in number, and are located mainly near the eastern end of the mountain; in order, westward, they are the North Branch of the Susquehanna, Muncy Creek, Lycoming and Pine Creeks, West Branch of Susquehanna, and Beech Creek. South from the gorge of Beech Creek the mountain is unbroken as far as the Maryland line, but is deeply notched in its crest by several short ravines.

These six ravines offer the only avenues of communication with the northwestern part of the State and between central Pennsylvania and New York State. Each one of them is occupied by a

railroad, the lines from Williamsport to Elmira along the Lycoming and from Lock Haven westward along the West Branch being the most important. South from Beech Creek the Allegheny front is crossed but five times by railroads in the hundred miles to the Maryland line. Four of these lines are between Beech Creek and Gallitzin, three short coal roads, and the main line of the Pennsylvania Road to Pittsburg. In each case the ascent is made at the only points where the crest is notched by short ravines, and even then the roads are forced to maintain steep grades. In the case of the Pennsylvania Road the ascent from Altoona at the base of the mountain is made only by means of the famous "Horseshoe curve" and heavy grades to the tunnel at Gallitzin, several hundred feet below the crest of the Front. From Gallitzin to the Maryland line, about forty miles, there is but a single notch in the crest, the one occupied by the Baltimore and Ohio on its way from Cumberland over to Pittsburg. To make this ascent at all such heavy grades are necessary that extra engines are detailed to help the traffic over that portion of the road; and for this work the largest engine in the world has been built recently. Both the notch at Gallitzin and the one occupied by the Baltimore and Ohio are located opposite westward-flowing streams, the Conemaugh and Castleman Rivers, which afford comparatively easy routes through the hilly country to the west.

In all the region that lies beyond the Allegheny Front the movement of travel is almost entirely dependent on the occurrence and extent of stream-courses. Over thousands of square miles hardly a mile of railroad can be found which does not faithfully follow the course of some stream, large or small, as the Allegheny, Monongahela, Conemaugh, Kishiminetas, Red Bank, and a host of others. The reason lies plainly enough in the dissected character of the country; a region broken by ramified streams into an endless variety of detached hills, with many deep valleys, whose narrow floors or sloping sides offer the only continuous levels for railroad-building. The absence of large streams, and consequently favourable routes, has left tracts of hundreds of square miles in the midst of the bituminous coal regions still unentered by railroads.

The highways, also, are almost without exception located in or along the valley bottoms or sides. Some few roads gain the hilltops, and run from one to another in a winding course for several miles, but they for the most part follow up one ravine to the lowest divide and descend by the opposite ravine on the other side. Between any two points the topography determines the direction

of the route. Here the ratio of miles of road to unit of area is at a minimum; in places many square miles of territory are without roads of any kind, or only those of the most primitive sort. The miles of trails and mere tracks leading over the steep hills suggest the conditions of a truly mountainous region.

In sharp contrast with these conditions is the freedom of movement over the narrow Erie lowland, generally level, and of low relief. Over the lowland travel moves at will; and the two great trunk lines of railroads, which utilize it as an easy gateway to the west, run in wonderfully straight lines when compared with the winding and circuitous routes along the rivers in the hilly country near by.

The central district, the last to be considered, lies between the Allegheny Mountain and Kittatinny or Blue Mountain, and is divided into four well-defined topographic areas: (1) the Catskill or Pocono plateau, at the northeastern end; (2) the anthracite coal region; (3) the open country of the Middle Susquehanna; and (4) the mountains of the Juniata region.

After crossing the Delaware River into Pennsylvania, the Catskill Mountain plateau of New York State extends as a high tableland westward over northern Pike, Monroe, and Carbon Counties to the Lehigh River. The whole plateau is a nearly level upland, over which, when once the general level is reached, travel is not difficult. Highways are few as compared with the other parts of the State, mainly because there is no demand for them; but six lines of railroads cross the plateau from the coal fields to reach the seaboard markets. Here, as along the Allegheny Mountain, the lines of railroads ascend and descend the rim by the short ravines that notch it, as Spring Brook and Roaring Brook on the western edge and Lackawaxen Creek on the east.

The anthracite coal fields, perhaps, present the most interesting series of controls of travel to be found in the State. The coal basins are, from their shut-in nature, not easily accessible; but their great mineral wealth demands an outlet, and hence hundreds of miles of railroads have been built where otherwise, probably, not a mile of track would have been laid. The basins are bounded and traversed by a series of parallel and converging ridges, even-crested, steep-sided, and of great linear extent, which rise 1,000 feet above the intervening valleys.

Though the floors of the valleys are far from level, the differences in elevation are comparatively unimportant; and in any given valley the travel both by highways and by railroads is hardly more limited than in the hilly country of the southeast province.

Only when it is a matter of inter-valley communication do the real difficulties appear. Over most of their extent the ridges present solid barriers to transverse travel. In places, however, their crests are lowered either by slight Vs, in a notch a few hundred feet deep, or in narrow gashes all the way down to the level of the neighbouring valleys. The former are known as wind-gaps, the latter as water-gaps. The importance of these gaps cannot be overestimated; toward them nearly all lines of inter-valley travel are seen to converge, and often the larger towns, as Shamokin and Pottsville, are located at these natural centres of communication.

On the south and east the coal basins are shut in by the Blue Ridge and the Pocono plateau, already mentioned. The Blue Ridge, in its extent of 100 miles from the Delaware River to Harrisburg, is breached but three times by the Lehigh River below Mauch Chunk; by the Schuylkill at Fort Clinton; and finally by the Swatara. Not one of these gaps exceeds a quarter of a mile in width, and yet they furnish the only gateways from the southeast through the high rampart of the Blue Ridge to the rich coal fields of Schuylkill, Carbon, and Luzerne Counties. The gap of the Lehigh at Mauch Chunk not only acts as an outlet for the eastern part of the southern coal fields, but also takes a large share of the traffic from the northern field.

The northern field in Wyoming and Lackawanna Counties has a natural outlet both to the west and to the north along the east branch of the Susquehanna River. To the west, however, is away from the markets, and to the north the course of the stream is so winding, and the valley so narrow and steep-sided, that most of the coal roads choose the shorter course, and make the difficult ascent of the Pocono plateau rim to reach the seaboard markets.

In the southern coal fields the problem of travel and transportation is complicated by the fact that each basin has a double rim; that the gaps in the bounding ridges are sometimes not opposite each other, and also not opposite the gaps in the Blue Ridge, or that there are no convenient gaps at all. For example, there is but a single eastern or southern outlet from the Shamokin field—the gap near Mt. Carmel. But the gap in Locust Mountain, the inner rim, is a little over four miles west of the gap in Mahanoy Mountain, the outer wall; while in front of the latter is Broad Mountain, through which no gap is offered. Between the two gaps the railroad has a comparatively easy, if somewhat longer, route in the narrow valley that separates the ridges; but in getting over Broad Mountain it is necessary to follow up the ravine of Rattling Run,

with a grade above Gordon Station of not less than 200 feet per mile, or about 4 per cent. A grade slightly steeper than this is found near Fairview, a few miles south of Wilkesbarre. A 2 per cent. grade, or 100 feet to the mile, is ordinarily considered as the maximum for all regular traffic. The coal roads out from Tremont, near the western end of the field, find their way easily enough through the gaps in Second and Sharp Mountains, only to be met by the unbroken wall of the Blue Ridge, which makes necessary a detour of seven or eight miles westward to Swatara Gap, or about twelve miles eastward to the Schuylkill Gap.

At Mauch Chunk, at the eastern end of the field, near the famous Lehigh Water Gap through the Blue Ridge, there is no break in the sharp rims of the basins where they converge in the high, prow-like termination. It was here that the famous gravity road was operated from the crest of Summit Hill down to the Lehigh Canal. Since then a tunnel three-quarters of a mile long has been driven through Hesquehoning Mountain to the mines in the valley. Other tunnels are found in different parts of the basins, where no convenient gaps exist—one over half a mile long near Mahanoy City, another about the same length near Williamstown, a smaller one at Lofty, a few miles east of Mahanoy City, and so on.

Still another means that is resorted to in getting over the unbroken ridges is the switchback, the best example of which is on the Clark's Valley branch of the Philadelphia and Reading Railroad over Sharp Mountain, from Clark's Valley to the headwaters of the Swatara. The ascent is nearly 100 feet, made in a double switchback about three miles long—six extra miles of road, with heavy grade, to win a way over a single ridge.

From the end of the line in Clark's Valley to Swatara Gap the nearest break in the Blue Ridge is only six miles. In between, however, lie the ridges of Second and Third Mountains, and to reach the gap the switchback is necessary, together with a detour of over thirty miles along the upper Swatara. In other sections, where but a single route is practicable, it may be followed by two or more rival roads, as the Delaware, Lackawanna and Western and the Pennsylvania Railroads, which parallel each other for miles along the North Branch of the Susquehanna; the Lehigh Valley and the Philadelphia and Reading Railroads, along the Lehigh River; or the Reading and the Pennsylvania lines, along the Schuylkill.

Similar difficulties of unfavourable routes, long detours, and heavy grades are met in all parts of the coal fields, and yet hardly any other section of the State has more miles of railroad per unit

of area. So striking is this feature that on any good railroad map of the State the limits and locations of the different fields can be determined by no other guide than the network of lines covering the basins.

The region of the Middle Susquehanna, the third district of the central province, is an open country, with fewer ridges, broader valleys, and generally favourable conditions of travel. Its main interest lies in the fact that its southern edge contains the gateway to the western part of the State, the gap of the Susquehanna where it crosses the Blue Ridge at Harrisburg. But this gap, important as it is, would be of little consequence without a pathway beyond it. For behind the Blue Ridge, stretching away to the westward, lies the great series of parallel ridges of the Juniata region, which, were they not breached one after another by the transverse course of the Juniata River, would offer an insurmountable barrier to east and west travel. The Juniata pathway leads off from the Susquehanna a few miles above Harrisburg, and though its course, winding about through the ridges, necessitates many miles of extra lines for the railroads that follow it, the importance of its existence there at all can hardly be overestimated.

The last division of the central province, the region of the Juniata, is, like the anthracite coal areas, a region of steep-sided, even-crested linear ridges, sometimes parallel, often converging, and separated by narrow longitudinal valleys. The region is completely walled in on the east by the unbroken rampart of the Blue Ridge from Harrisburg south to the Maryland line. In the valleys the main lines of travel are longitudinal, parallel to the ridges. In any one valley communication is open, and each valley is more or less a unit, as shown by single valleys forming counties, like Juniata, Perry, and Mifflin Counties. Inter-valley travel is, perhaps, even more limited than in the northern area, mainly because of fewer transverse streams to give the advantage of gaps. There is, also, not the great economic need for railroads as in the coal fields. A good example of the difficulty of inter-valley travel is afforded by Bedford in the valley of the Raystown Juniata and McConnellsburg in the valley of Sideling Hill, thirty miles to the east. Between them are two unbroken ridges, and the railroads, paralleling the ridges, necessitate a journey of over a hundred miles between the two towns.

When the State is considered as a whole, one can hardly fail to be struck with the remarkable combination of topographic details, which, by a slight change or omission, might have made a vast dif-

ference in the progress and development of the State. The most open communication is on the southeast, where lines can come from all directions to the only port of the State, Philadelphia. The long break in the South Mountain belt gives easy access to the Great Valley, and opens the way to the middle of the State. Three of the four gaps in the Blue Ridge are in that part of its extent lying in front of the coal fields, to which means of entrance is of the utmost economic importance. The fourth and last gap in the Blue Ridge is opposite the break in the South Mountain, and also in such a place as to be an important part of the gateway to the western part of the State. The gaps are absent only in that part of the Ridge where their need is not great. The transverse course of the Juniata offers a pathway through the otherwise unbroken ridges, from the gap of the Susquehanna to the Allegheny Front at a particular place where crossing is impossible. And, finally, on the western side of the Front, the Conemaugh and Castleman Rivers head near the only points where for miles in extent crossing by railroad is practicable, and offer easy routes for the roads through the broken country of the western district.

THE BIOLOGICAL EVIDENCE OF RIVER CAPTURE.*

BY

DOUGLAS WILSON JOHNSON.

Whenever one stream captures a portion of the drainage of a neighbouring stream, certain results are produced which become evidences of the capture which has occurred. By a study of these results we are able to tell much about the former relations of the streams affected, and may even learn the approximate time at which the change took place.

It will readily appear that river capture may produce two different classes of results: first, those which can be produced by nothing else than river capture, and which are therefore to be regarded as conclusive proofs of such capture; and, second, those which can be produced by other agencies as well, and which are therefore not in themselves proof of capture. In the study of drainage modifications in general, and in the study of any particular case of capture, it is a matter of prime importance to distinguish

* Abstract of a paper read before the Philadelphia meeting of the Association of American Geographers. The complete paper will appear in "Science," and a full discussion of the Tennessee problem in the Journal of Geology.

clearly between these two classes of results, in order that those who follow our work may fully understand the character of the evidence upon which our conclusions are based.

In the discussion of drainage modifications, different students of the subject have pointed out a variety of evidence leading to the conclusion that capture has occurred. One such line of evidence is that furnished by the distribution of fresh-water shells, which we may term the biological evidence of river capture. Two neighbouring streams may have characteristically different faunas inhabiting them. If a portion of the drainage of one stream is captured by a branch of the adjacent stream, the fauna of the captured one will be mingled with that of the captor. Such a commingling of faunas becomes one evidence of the capture.

This line of evidence has been advanced in support of several cases of supposed river capture, and has been widely accepted as a definite proof of capture. The conclusions arrived at are in some instances far-reaching in their effects, and it would seem very essential to weigh carefully the evidence upon which those conclusions are based. Especially is this true of evidence offered and accepted as conclusive in and of itself.

The biological evidence can be accepted as proof of river capture only if we grant that no other agency can effect the commingling of forms referred to. It is therefore pertinent to ask: Are there any other means for the dispersion of fresh-water shells besides river capture? If so, is there any reason why the shells in question may not have been so dispersed? And is there any evidence of such dispersal elsewhere, under conditions which preclude the possibility of river capture's having been the effective agent?

The first question must be answered in the affirmative. It is known that the young of many of the forms in question possess the power to attach themselves to the feet or feathers of birds, or to insects, or to plants carried away by birds, and that they may thus be transferred from the waters of one stream to those of another. It is believed that they may also pass from stream to stream across the low interstream areas near the sea in times of great floods, or that they may migrate along the shore itself. These and other means of dispersal are considered more in detail in another place, and it is only desired to call attention here to the fact that they exist.

According to those who are most familiar with the anatomy and habits of the special forms involved in the biological evidence as heretofore employed, there is no reason why they should not be dispersed in the ways above mentioned.

That these other means of dispersal are effective is shown by the fact that the same species supposed to prove the capture are elsewhere found inhabiting different streams, far distant from each other, under conditions which make it impossible that river capture should be held responsible for their location. Other similar forms have almost world-wide distribution, inhabiting different continents, necessarily having been dispersed by some of the other agents referred to, or by means concerning which we have no knowledge.

These general facts, which I have elsewhere discussed more fully, compel the conclusion that in its broadest terms the biological evidence of river capture is not conclusive in itself. We must make a careful study of the circumstances of each special problem; note the character of the divide between the two streams, to see whether it is favourable for the transfer of forms across it; examine the special forms under discussion, to see whether they are adapted to the various means of dispersal; ascertain whether those forms have elsewhere been distributed by some agent which could not have been river capture—in short, make a critical test of the evidence before using it.

Such a test has not been made in cases where this line of evidence has been most effectively employed, with the result that evidence, which is shown to be incompetent in the light of the distribution elsewhere of the species involved, has been accepted by many as a proof of river capture where positive evidence now available tends to show that capture did not occur. Thus, the fact that shells especially characteristic of the Tennessee River have been found in the Coosa and Alabama Rivers has been urged as proof that the Tennessee River formerly flowed southward by way of the Coosa and Alabama into the Gulf, and owes its present course to capture near the Chattanooga by a stream from the west. It appears, however, that the divide between the waters of the Tennessee and Coosa basins is low and insignificant, and so situated as to be peculiarly favourable for the transference of the shells from one stream into the other. Furthermore, it is seen that the same shells upon which the argument in favour of capture is based occur in other streams, where it is impossible to suppose that they have been transferred by river capture. If river capture is not responsible for their distribution in these last cases, then it is not possible to prove capture of the Tennessee on this evidence alone. Capture *may* be responsible for the distribution in such cases, but it *need not* be. It is believed that in the case of the Tennessee the distribution must have been effected independently of river capture.

Massachusetts Institute of Technology.

GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

TRANSACTIONS OF THE SOCIETY, FEBRUARY, 1905.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, February 21, 1905, at 8.30 o'clock P.M.

Vice-President Moore in the chair.

The following persons, recommended by the Council, were unanimously elected:

To Honorary Membership: Sir John Murray.

To Fellowship:

Harry Skull.	Robert C. Geer.
N. A. Bengtson.	John B. Uhle.
Trenor L. Park.	Julian Hastings Granbery.
T. T. Eckert, Jr.	Stephen J. Meeker.
Antonio Reynes.	Howard Van Sinderin.
Franklin Delano Roosevelt.	Paul G. Thebaud.
Miss Helen L. Gennert.	Philip Ruprecht.
Willis Fletcher Johnson.	H. E. Heath.
J. Henry Townsend.	Alain C. White.
Robert Olyphant.	J. Culver Hartzell.
John H. J. Stewart.	Robert Peet Skinner.
Clement S. Dunning.	James P. Hall.
Rev. John Howard Raven.	Fullerton Merrill,
T. Tileston Wells.	Seth B. Robinson.
W. P. Hardenbergh.	Edward True Wing.
William Church Osborn.	John E. Whitaker.
Madison Grant.	William H. White.
Frederic de P. Foster.	Stephen Loins.
William T. Blaine.	George R. McDougell.
William Lee Howard.	George C. Yeisley, D.D.
William R. Powell.	Peter Zucker.

The Chairman then introduced the speaker of the evening, Mr. Adolphe F. Bandelier, who addressed the Society on The Region of Lake Titicaca. Stereopticon views were shown.

On motion, the Society adjourned.

AMERICA.

RECONNAISSANCE WORK IN MEXICO.—Mr. Robert T. Hill, accompanied by Dr. E. O. Hovey, of the American Museum of Natural History, and assistants, has gone to Mexico to study the geography and geology of the Western Sierra Madre. This reconnaissance work will continue Mr. Hill's investigations upon the mountains and deserts of the Southern Cordilleras, and also Dr. Hovey's studies of volcanic phenomena. The expedition is fully equipped for topographic, photographic, and geologic work.

GREAT BRITAIN ANNEXES A SMALL ISLAND.—According to the *Geographische Zeitschrift* (1904, p. 581) the British annexed in August last the little Aves Island,

in the Caribbean Sea, west of Guadeloupe, in 15° 38′ N. Lat. and 63° 36′ W. Long. It is a low island, rising from a great depth, and has been little known. It stands 12 to 14 feet above sea-level, is visible only near at hand, and is, therefore, a danger to navigation. Its length is only about 4,000 feet. American vessels have taken away most of its guano deposits, and the only value of the island appears to be an anchorage on its southwest side in six fathoms of water.

MARINE BIOLOGICAL LABORATORY AT TORTUGAS.—One of the research projects authorized by the Carnegie Institution was the establishment of a laboratory for the study of the marine biology of the tropical Atlantic, using Tortugas, Fla., as a land station. Mr. Alfred G. Mayer is the director of the work. The main laboratory and a small laboratory were erected in July last. A staunch sea-going vessel of light draft, capable of making headway against the strong currents of the coral reefs and the Gulf Stream, was launched at East Boothbay, Me., in August. She has accommodations for seven men, is equipped with a full set of trawls, dredges, nets, and other apparatus for the study of marine life, and the cabin has ample room for such laboratory work as can be accomplished at sea. The director says (Year Book No. 3 of the Carnegie Institution) that the vessel has proved to be an able yacht, and displays her best qualities in heavy weather. Every encouragement is to be given to eminent naturalists to pursue their investigations at the laboratory.

THE IROQUOIS BEACH IN ONTARIO.—Glacial Lake, Iroquois, was an ice-dammed lake formed when the continental glacier blocked the St. Lawrence outlet and caused the water to rise to the level of the divide at Rome, New York. Its shore-lines are very distinct on both the Canadian and the American sides, where they were early recognized as elevated beaches even by untrained travellers. Much study has been given to these shore-lines of the ancient glacial lakes, and in New York, largely as a result of Dr. Vibbert's careful work, they have been accurately mapped. On the Canadian side the beaches have been less carefully studied, and therefore a recent paper by Prof. A. P. Coleman (Bull. Geol. Soc. Amer., Vol. 15, 1904, pp. 347–368), in which the Canadian beaches are carefully mapped, and described in some detail is a distinct contribution to the literature of the large glacial predecessor of Ontario.

The beach is readily traced from near Hamilton, northeastwardly to the Trent River, but is not found beyond Havelock on the north side of the Trent. In its eastern extension beyond Colborne the beach splits into several branches at different levels. The fact that the beach ends in this way, both on the Canadian and the New York side, is a confirmation of the theory long ago advanced that the beaches were formed in an ice-dammed lake, and that the shore-line records on the northeast end disappeared with the melting away of the ice-dam against which they were made.

In Canada, Coleman finds the beach no longer horizontal, which is in harmony with the conditions in New York. The direction of greatest inclination is N. 20° E., and the amount of land-tilting which the inclination of the beaches suggests is 2 feet per mile from Hamilton to York, near Toronto; from York the quays, where the beach splits, 3.4 feet per mile; and from that point to the terminus of the beach 4.17 feet per mile. Coleman believes that 7,000 years is too short a time for the events since Lake Iroquois began, and that even 35,000 years are scarcely enough. The evidence upon which he bases this belief does not seem conclusive.

R. S. T.

AFRICA.

THE STANLEY FALLS—GREAT LAKES RAILROAD.—*Le Mouvement Géographique* (Nov. 27, 1904) says that this railroad, which is to be 75 miles long between Stanley-

ville and Ponthierville around the rapids which interrupt navigation in this part of the Upper Congo, is now completed for 22 miles, and it is expected that trains will be running over the entire road by the beginning of next year. The entire force of 4,000 workmen was obtained from the upper river, and under the superintendence of 70 whites they have learned rapidly to construct the roadbed and perform all other kinds of manual labour required in railroad-building. Temporary bridges of wood, to be replaced later by steel bridges, are being thrown over the streams. The ties for the roadbed will be entirely of wood supplied by the forests through which the route passes. Heretofore, on tropical Africa railroads, steel ties have been used, and the present experiment will be watched with interest. When the road is completed there will be uninterrupted steam transportation from the mouth of the Congo over 1,600 miles up the river.

New Port on the Red Sea.—Mr. Corbett, the Financial Adviser to the Egyptian Government, reports that the railroad between the Nile at its confluence with the Atbara River and the Red Sea has been energetically pushed during the past year, and will, it is hoped, be completed early in 1906. The road will be designated as "The Nile–Red Sea Railway." The maritime terminus of the road will be at Sheikh el Barghout, a place some 30 miles to the north of Suakin. The official name of the new port will be Bandar Sudan. The port has the immense advantage over Suakin of possessing a commodious harbour, easily accessible to ships of heavy draught.—(Board of Trade *Journal*, Jan. 12, and Feb. 2, 1905.)

Rubber-Planting on the Congo.—According to *Le Mouvement Géographique* (No. 2, 1905), the Congo State is doing everything in its power to increase the rubber crop in that region. About 10,000,000 rubber vines have been planted since the Government began the regulation of the rubber industry. About half of these planted vines are cultivated by the personnel of the Free State and half by the Societies engaged in collecting rubber. The number of plants set out in 1904 is estimated at about 3,350,000. The Government requires that a certain amount of rubber-planting shall be done for every ton of rubber collected, and at the same time the law forbids the killing of vines to obtain the sap, and requires that the vine be merely tapped, so that the wound heals and the plant is still productive. Rubber from the districts of the Kasai and the Equateur commands the best price in the markets.

Trade in the British East Africa Protectorate.—The railroad between Mombasa and the Victoria Nyanza continues to stimulate the foreign trade of this Protectorate, in which commerce, only a few years ago, was inconsiderable. The report on the Protectorate for the year ending March 31, 1904 (*Africa*, No. 15, 1904), shows a total import trade of $3,021,835, of which about two-thirds were traders' goods or commodities imported for purchase by the natives. Cotton and, to a much less extent, woollen goods, provisions, rice, flour, and building materials are the largest articles in this trade. The exports amounted to $799,075, of which ivory and hides and horns supplied about two-thirds, grain, rubber and copra being also important.

The statistics show some falling off in trade as compared with the previous year, and this is due to the diminution of the ivory exports by about $40,000. For some years laws have been in force restricting the slaughter of elephants. The first effect was to put into circulation the hoards of buried ivory among the natives. Now that these supplies are practically exhausted, the existing laws, while preventing the destruction of elephants, hamper the ivory trade.

ASIA.

EXPLORATION OF WESTERN TIBET.—The London *Times* announces the arrival at Simla of the small party under Captain Rawling after its exploratory work in western Tibet (BULLETIN, Feb., 1905, p. 103). The sparse population gave the expedition a very friendly reception. Most of the inhabitants had never seen Europeans before and showed the greatest interest in the dress and appearance of the travellers. The Miriam La or Pass, the water-parting between the Sanpo (Brahmaputra) and the Sutlej, the large tributary of the Indus, was crossed at the end of November. It is 16,600 feet above the sea-level; but though snow was falling, the pass was easily surmounted. The Great Mansarowar Lake was carefully explored for the purpose of clearing up long-standing controversies regarding it. There was no flow at the outlet, and a rise of 3 feet would have been necessary for the stream to run. The Tibetans said that during the rains and when the snow melts (about 4 months in summer) there is an outflow. A hot-water spring was discovered a mile down the channel in the direction of the next lake, Rakas Tal, which was frozen over and had no outflow, though the natives say a stream ran from it in past years. The net result of the exploration is to place the source of the Sutlej much farther to the west than has been supposed. The British frontier was reached on Christmas Eve after crossing the Ayi-La, 18,400 feet high, amid falling snow. The Sutlej there flows through very broken country, and some of the ravines are 2,000 feet deep.

BAILEY WILLIS'S EXPLORATIONS IN EASTERN CHINA.—Mr. Willis, who received the grant for geological exploration in eastern China from the Carnegie Institution, has a report in Year Book No. 3 (1904) covering his work. He returned to the United States last summer. Some of his discoveries in eastern China were of remarkable interest. The glacial deposit of Cambrian Age, for example, is an almost unique discovery, equalled in interest in its way only by the extraordinary evidences of glaciation in southern Africa in Carboniferous times.

On the Yangtse River, in lat. 31°, as far south as New Orleans and not high above sea-level, the explorer discovered a large body of glacial till. It is unstratified, a mass of indurated clay and heterogeneous boulders, many of which show glacial polish and striæ. Prof. Chamberlin and other expert glacialists, to whom specimens have been submitted, pronounced them unquestionably of glacial origin. This deposit lies near the base of the Paleozoic system, beneath limestone which, in its lowest layers, contains pebbles from the till. The body of till is 170 feet thick. It demonstrates the existence of glacial conditions in a very low latitude in the early Paleozoic. Mr. Willis says:

> A similar occurrence at a closely-related Cambrian epoch has been reported from Scandinavia, but nowhere else has like evidence been found. This discovery takes a place among the unique facts of geological history, and the latitude, the conditions of occurrence and the conclusiveness of the evidence being considered, it will have great weight in reference to theories of climatic change.

Another far-reaching result in its effect upon broad geological theories is a contribution to the knowledge of mountains. Mr. Willis has extended the evidence that in the northern hemisphere the features of the earth's surface express recent activity of vigorous internal energy:

> In America, during the last fifteen years, through the study of topographic forms, it has been shown that the mountains of this continent are relatively recent features as compared with the rocks composing them, and owe their elevation to forces acting during the latest geologic periods down to the present. It was a point of prime interest in the comparative geology of continents whether the American methods of study applied to Asia would show that mountain growth had recently been active there also.
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> The observations of this expedition demonstrate clearly that the histories of mountains in North

America and China run closely parallel in time, in manner of development, and in resulting features of relief. The studies of Prof. Davis in western Asia point in the same direction, and the investigations of Profs. Penck and De Martonne in the Alps and Carpathians extend the generalization to central Europe. The conclusion that mountains are recent growths—indeed, are in some districts now actually growing—is far-reaching in effect on theories of the earth's internal energy and its manifestations.

CADASTRAL SURVEY OF SIAM.—The *Report* on the work of the Royal Survey Department of Siam for 1901–2 has been received. The most important work in progress is the Cadastral Survey of the cultivated alluvial land in the valley of the Menam River. The field party in that season numbered 154 men, of whom six were European officers. Their surveys reached the satisfactory total of 512 square miles. Much attention is being given to the training of Siamese in the various phases of the work, and, with some supervision their service is adequate. The main object of the Cadastral Survey is to afford the Government a perfectly reliable means of assessing the land-tax due by the owners or holders of the land, who are required to contribute to the revenue of the country. The survey is also of much importance to landholders, as they learn the exact areas of their holdings, and derive improved security from the issue of title-deeds based on the Survey. Three charts show the progress of the work.

MAP OF INDIA AND ADJACENT COUNTRIES.—The Trigonometrical Branch of the Survey of India sends a pamphlet (Professional Paper No. 1, Second Edition) concerning the map which is now being prepared on a scale of 1:1,000,000. The scale is in accordance with the recommendation of the International Geographical Congress, at its meetings in London, Berlin, and the United States. The projection adopted is a modified secant, conical projection, somewhat similar to that employed by Euler, in 1777, for his map of Russia. This projection was chosen because, as the area to be included embraces 36° of latitude and 80° of longitude, some form of conical projection was clearly indicated, and also because it was essential that all the sheets, 136 in number, should fit together to form one map. A certain amount of error will be unavoidable, but all the latitudinal distances will be correct, and the errors in longitude will not be of much importance. The map will fit into the scheme of making a map of the world on the uniform scale of 1:1,000,000. The scale is, of course, smaller than that employed in the actual field surveys. The completed map will show India a little west of the centre of the map, with Persia and eastern Arabia forming its western limits and the shores of eastern China at the eastern border of the map. Bokhara, Kashgar, and Peking will be on the northern edge, and the Horn of Africa and northern Sumatra on the southern border.

EUROPE.

ITALY'S DENSITY OF POPULATION.—Vol. 5 of the Italian Census taken on February 10, 1901, has a map in colours, showing the density of population in each of the political subdivisions of the kingdom. The most thinly-populated districts, among the Italian Alps and in the Grosseto and Matera Districts of the Peninsula, have less than forty inhabitants to the square kilometer. The mean density of population of the Kingdom is 113.28 to the square kilometer. The greatest density is in Naples and its environs, where there are 3,310 inhabitants to the square kilometer.

ITALIAN EMIGRATION.—The *Report* of the Italian Commission of Emigration for 1904 says that in two years the emigrants have numbered 527,000. More than half of them go to the United States; and the *Report* contains many communications from Italian consuls here for the guidance of the Emigration Office, which desires to

extend such aid and protection as is possible to these numerous outgoers. It is said, however, that this work of social charity is imposing a burden upon the country which is not easily borne in its present economic condition.

STROMBOLI.—In an article illustrated by eleven excellent, full-page half-tones, Dr. Tempest Anderson describes (Geographical Journal, Vol. XXV, 1905, pp. 123–138) recent changes in the crater of Stromboli, observed as a result of two expeditions to the island—one in 1888, the other in 1904. This crater, commonly called "the lighthouse of the Mediterranean" because of the frequency with which it is lighted by the volcanic fires, lies just to one side of the centre of the island of Stromboli, the northernmost of the Lipari Islands, just north of Sicily. The entire island is volcanic, and rises from the deep sea to a height of a little over 3,000 feet above sea-level. Including the submarine portion, it is a large and lofty volcanic cone. There is evidence of earlier, probably prehistoric, eruptions of great violence and magnitude; but the eruptions of the historic period have all been moderate, though there is considerable variation from time to time. The ordinary eruptions, which occur every few minutes, are so moderate that the process of eruption may be safely photographed from near at hand, as the author did, obtaining three pictures of different stages of the same eruption. Most of the eruptions bring forth ash, but during some lava pours forth and flows down the side. Occasionally eruptions are so severe as to affect the entire island; and the author gives a list of these, recorded since 1879.

The crater lies on the slope of the island, just northwest of the highest point, and about 600 feet below it. Below the crater is a steep slope, the Sciara, which descends from the crater to the sea, having an angle of about 35°, or the angle of repose of the volcanic ash which is erupted. With each eruption ash falls upon the slope, and some of it rolls into the sea; but, although the volcano has been in almost constant eruption during the historic period, the supply of ash has not been sufficient to build this slope up regularly, as in other volcanoes. The chief contribution of Dr. Anderson's paper is the description, with excellent illustrations, of changes which have occurred in the form and position of the crater between 1888 and 1904. Altogether, considering the length of time and frequency of eruptions, the amount of this change is exceedingly slight. R. S. T.

COAL RESOURCES OF THE UNITED KINGDOM.—The Royal Commission appointed in 1901 to inquire into the coal resources of the United Kingdom has issued its final report, which, on the whole, is of a reassuring character. Adopting 4,000 feet as the limit of practicable depth in working and one foot as the minimum workable thickness, the Commissioners estimate the available quantity of coal in the proved coal fields of the United Kingdom to be 100,914,668,167 tons, as compared with 90,207,285,398 tons estimated by the Coal Commission of 1871, notwithstanding the fact that 5,694,928,507 tons have been raised in the meantime. The excess is accounted for by the more accurate knowledge of the coal seams. It is also estimated that there are 39,483,000 tons of coal in the concealed and unproved coal fields. It is thought that in future thin seams will be worked more extensively than at present, and that the use of coal-cutting machines will facilitate this work. The coal consumption in the United Kingdom for 1903 was 167,000,000 tons.—(*Nature*, Feb. 2, 1905.)

THE RAINIEST DISTRICT IN EUROPE.—Dr. Kassner, of the Prussian Meteorological Institute, discusses "Das regenreichste Gebiet Europas" in *Petermanns Mitteilungen* for December, 1904. This district, to which attention was first directed

by Hann (*Meteorologische Zeitschrift*), 1890, 143; 1894, 189), on the Bocche di Cattaro, on the eastern shore of the Adriatic, rises abruptly several hundreds, and in places thousands, of meters above the sea. The region is that of the Karst. The rainfall data for twelve stations cover ten years (1891–1900), and for three stations cover at least five years. The short periods have been reduced to the longer period in the usual way. A chart showing the rainfall of the district indicates an increase inland and towards the north, until a mean annual rainfall of 177 inches is reached, which is found nowhere else in Europe. The district of this exceptionally heavy precipitation extends east and west; is about six miles long by three wide; increases in elevation from east to west, from 700 to 1,300 meters, while isolated summits rise some hundreds of meters above the general level. The station with the maximum of rainfall is Crkvice, situated at an altitude of 1,097 meters above sea-level, with a mean annual precipitation of 179.30 inches and a maximum annual precipitation of 234.72 inches in 1896. The rainiest season is the winter, *i.e.*, it accords with the general conditions of the Mediterranean climates. During the summer, in consequence of the general pressure distribution, the prevailing winds are northerly to easterly, *i.e.*, continental and dry. In winter the prevailing winds are southerly and moist. The seasonal distribution of rainfall at Crkvice is as follows: winter, 36%; spring, 26%; summer, 7%; autumn, 31%. It is interesting to note that at Cetinje, where the mean annual rainfall is over 100 inches, the summer is so dry that drinking-water is distributed by the pitcherful from a spring kept under the control of the authorities, while water used for other purposes is brought from a spring outside the town. The variations in the rainfall from month to month and from year to year are very large. At Crkvice, in 1896–97, the months of October, November, December and January each had over 40 inches of rainfall, giving a total in these four months of not less than 179.84 inches. The precipitation is chiefly in the form of rain, and is frequently associated with thunderstorms. Snow is heavy in winter, and in some years stations at considerable altitudes are often isolated for days together.

R. DEC. W.

SWEDEN'S FOREIGN COMMERCE IN 1903.—The official statement of Sweden's foreign trade in 1903 says that the imports were $148,702,800; exports, $122,713,800. The leading imports in order of importance were raw minerals, cereals, and flour, manufactured cottons, woollens and silks, yarns and meat products; timber formed more than one-third of the exports, other leading sales including lumber, fish, and other animal products and raw metals. The countries with which Sweden has long held the largest commercial relations are Great Britain and Ireland, Germany, and Denmark, three-fourths of the commercial movement of 1903 being with these countries.

EXPLORING THE VATNA JÖKULL.—The Scottish Geographical Society sent L. S. Muir and J. H. Wigner to Iceland last summer, and a brief account of their work has been published (*Scott. Geog. Mag.*, Nov. 1904). They crossed the great snow field of the Vatna Jökull, using *skier* to a considerable extent, especially in the soft snow. Hauling sledges loaded with tent and provisions, they started into the snow field at its northeast corner, and their progress, though never rapid, was fairly steady between August 13 and 25, when they reached solid ground on the southern edge near a fine glacier lake. Still keeping to the ice, however, they pushed farther west and were detained by bad weather for nearly a week in a large cave found in an old crater. A few miles farther west brought them off the ice on September 3. The total distance was about 80 miles in a straight line and as many more in side excursions. Four

virgin peaks were climbed, including Hàgöngur, the second highest measured peak. The area of the Jökull must be at least 4,000 square miles, or about one-tenth that of Iceland. The southern edge has this summer been carefully surveyed by a Danish staff, but the remainder, particularly the northeast, is still practically untouched.

The explorers say that the standard map by Dr. Thoroddsen, which is a splendid piece of work as regards the rest of the country, is very inaccurate in all relating to the Vatna Jökull. The Bruar Jökull, for example, extends for at least 20 miles farther north than is shown; the lake Graenalón is not entirely surrounded by ice, but touches dry land on two sides; the mountain Björn is not a slender ridge but a huge mass with a front to the Jökull of several miles; a number of peaks are incorrectly placed, and some just as important are not marked at all.

RUMANIA'S BLACK SEA PORT.—The port of Constantza, which the Rumanian Government, at large expense, adapted for the use of steamships several years ago, is growing rapidly in commercial importance. With its present steamship connections it provides the shortest route from central Europe to Constantinople, Asia Minor, and India. Ample harbour works and warehouses have been supplied, and the exports of grain and other commodities are constantly increasing. The exports in 1903 amounted to 401,095 tons, chiefly grain and flour, which are sent to Egypt, Spain, Italy, France, the Netherlands, Germany, and England. The imports were 56,262 tons, or nearly double the quantity of the previous year.—(*Export*, No. 5, 1905).

NEW PUBLICATION OF THE FRENCH ALPINE CLUB.—The Club Alpin Français has replaced *l'Annuaire* and *le Bulletin* with a monthly, the January number appearing on the 15th of that month. The name of this attractive magazine is "*La Montagne*, Revue Mensuelle du Club Alpin Français." The publications which it supersedes have been issued for many years. The Club, through its new monthly, hopes to widen its influence, which has so long been exerted in behalf of the exploration and enjoyment of mountains. Every thing relating to mountains, and particularly to the higher mountains, will come within its scope. The first number is finely illustrated from photographs.

OCEANOGRAPHY.

OCEANIC RESEARCHES.—At a meeting of the Challenger Society on January 25, the chairman, Sir John Murray, spoke on "The Relation of Oceanography to other Sciences" (*Athenæum*, Feb. 4, 1905). He pointed out that recent expeditions had made only inconsiderable alterations in the contour lines of the sea-bottom, published in the Challenger *Reports*, and was of the opinion that no great changes were likely to be made by the soundings of future expeditions. He believed that the great ocean basins had been practically unaltered through geological time, but that the continents (including a zone not more than 200 miles seaward of their present outline) had frequently altered their levels. He supported this belief by the fact that all known sedimentary rocks are of terrigenous character, to the exclusion of deep-sea material. The meteorology of mid-ocean, where the diurnal temperature range of the water is about 2° F., was contrasted with the meteorology of land-masses, where absorption and radiation are high and the diurnal atmospheric range may amount to 80° F. As an example of the far-reaching effects of the temperature, the speaker cited the range of animal variation where hot and cold currents are at war, amounting, in some cases, to over 40° F.; in such regions the animal death-rate is very high, and the dead organisms decomposing on the bottom start the formation of glauconite, a well-known constituent of sedimentary rocks. As another result of temperature, it

has been estimated that a tropical copepod lives twenty-four times as fast as an Arctic copepod in the same period of time. This may explain the predominance of specimens and paucity of species in the Arctic as compared with the tropical fauna.

PILOT CHARTS OF THE SOUTH ATLANTIC AND SOUTH PACIFIC OCEANS.—The U. S. Hydrographic Office intends to publish pilot charts of the South Atlantic and South Pacific Oceans, similar in scope to the present monthly pilot charts of the northern parts of these oceans. The charts will be published quarterly, instead of monthly, the first to appear being those for the South Atlantic. Successive seasonal charts of the South Atlantic will appear quarterly until the entire year has been included, after which a like series will be published for the South Pacific. The Hydrographic Office requests the co-operation of mariners in the preparation of these charts.

INVESTIGATIONS IN THE EASTERN PACIFIC.—Extracts from a letter by Mr. Alexander Agassiz to Fish Commissioner Bowers, dated Lima, Nov. 28, 1904, are printed in *Science* (Feb. 3, 1905). Mr. Agassiz joined the *Albatross* on Nov. 1 at Panama. She was under command of Lieut.-Commander L. M. Garrett, and Mr. Agassiz speaks in the highest terms of his efforts and those of the officers, crew, and scientific staff in the interests of the expedition.

The *Albatross* started at once towards Chatham Island in the Galápagos group, making a straight line of soundings from Mariato Point, the southwest corner of the peninsula on the west side of the Gulf of Panama. The deepest sounding (1,900 fathoms) was about 100 miles southwest of Mariato Point. The bottom then continued to show about 1,700 fathoms for nearly 200 miles, and then shoaled very gradually to 1,418 fathoms, about 80 miles from Chatham Island. The 1,000-fathom line was about 60 miles from Chatham Island. A short line was run south of Hood Island, revealing a somewhat steeper slope to that southern face of the Galápagos, over 1,700 fathoms being reached in less than 50 miles. The bottom then remained comparatively flat, attaining a depth of 2,000 fathoms about 100 miles farther south. This depth was carried eastward on a line from south of the Galápagos group to Aguja Point, near the northern end of Peru. The following results on this cruise from south of the Galápagos to Callao were obtained:

About half way to Aguja Point soundings increased to over 2,000 fathoms; remained at that depth to within 60 miles of the coast, when depth rapidly shoaled; soundings from Aguja Point southwest to 675 miles west of Callao showed depth increasing from 2,200 fathoms, 100 miles off the Point, to nearly 2,500 fathoms; running east to Callao, depth increased to about 2,600 fathoms; 80 miles off Callao over 3,200 fathoms found in the Milne-Edwards Deep; in two days spent in developing this Deep, soundings of 1,490, 2,845, 458, 1,949, 2,338, and 3,120 were found, showing great irregularity of the bottom in an area less than 60 miles in diameter.

Trawling, in charge of Mr. F. M. Chamberlain, began off Chatham Island, and was carried on at 20 stations. The pelagic collections were remarkably rich, and were especially noteworthy for the great variety and number of pelagic fish obtained inside the 300 fathom-line, from 300 to 650 miles offshore. Many of these fishes had been considered as true deep-sea fishes, to be obtained only when dredging between 1,000 and 1,500 fathoms or more. At one time the tow-net brought up from 300 fathoms, the depth being 1,752 fathoms, no less than 12 species of fish with nearly 150 specimens. Among the most interesting types found in less than 300 fathoms were *Stylophthalmus* and *Disomma*, both of which Chun considers as deep-sea fishes; also a species of *Eurypharynx*, obtained for the first time in the Pacific.

In the lines that were run across the great northerly current which sweeps along the coasts of Peru and Chile and is deflected westward at the easterly corner of the Galápagos Islands an unusually rich pelagic fauna was obtained at depths less than 300 fathoms. The finer tow-nets yielded immense collections of radiolarians, diatoms, and *Dinoflagellata*, many of which have been considered to live at great depth and upon the bottom. The number of diatoms found in these tropical regions is most interesting. They have been thought to be characteristic of more temperate and colder regions. The surface waters in places were greatly discoloured by their presence and bottom samples at depths of 1,490 to 2,845 fathoms formed a true infusorial earth, showing the influence of diatoms in the track of the great Peruvian current.

There was great variety in the hauls on successive days, showing how hopeless it is at sea to make any quantitative analysis of pelagic fauna and flora at any one station, within the influence of such a great oceanic current as the Chile and Peruvian stream.

Down to a depth of 2,200 fathoms or so the bottom was composed of *globigerina* ooze, its character being more or less hidden when near the coast by detrital matter which is drifted out to sea.

North of the Galápagos vegetable matter was found at nearly all the stations; and between the Galápagos and Callao such material was not uncommon in the trawl.

Six stations were occupied for the taking of serial temperatures, two at the western ends of the lines perpendicular to the coast across the Peruvian current, two in the centre of the current, and two at a moderate distance from the coast. These serials developed an unusually rapid fall between the surface and 50 fathoms, the temperature dropping from 71.7° to 59.2°; at 200 fathoms it was 51°; at 600 fathoms 40.7°, the bottom temperature at 2,005 fathoms being 36.4°. The temperature of the station in the central part of the current in 2,235 fathoms agreed with the western series. At the eastern part of the line in 2,222 fathoms with a bottom temperature of 36.4°, the surface being only 67°, there was a close agreement at 50 and 100 fathoms, the lower depths at 400 and 600 fathoms being from 1° to 2° warmer than the outer temperatures. A serial from the surface to 100 fathoms showed that the greatest drop in the temperature took place between 5 and 30 fathoms. The bottom temperature in nearly all the depths sounded was 36°, a high temperature for the depths attained.

Mr. Agassiz says that the changes made in the working apparatus of the *Albatross* have proved most satisfactory, From Callao the expedition was to proceed to Easter Island.

GENERAL.

Sale of Arctic Exploring Vessels.—The two Antarctic ships, *Terra Nova* and *Morning*, which relieved the National British Antarctic expedition on the *Discovery*, were sold at Portsmouth, England, on January 11. Mr. William Ziegler, of New York, bought the *Terra Nova* for $48,000, and she will be used by the relief expedition which will start next spring for Franz Josef Land to meet the Fiala party. The *Morning* was sold for $8,000. *Nature*, which gives this information, also says that the *Discovery* has been sold privately to the Hudson Bay Co. for $50,000.

Antarctic Meteorological Stations.—Permanent stations for carrying on meteorological observations in the far south are increasing rapidly in number, thanks to the admirable co-operation between the Argentine Meteorological Office, under its efficient and progressive Director, Mr. Walter C. Davis, and recent Antarctic expeditions notably the Scottish National Antarctic Expedition. The Argentine

Government has resolved to continue the station at Scotia Bay, South Orkneys, for a third year, and a new party, consisting of five men, has recently been sent there. A new house is to be built for the magnetic instruments. During the past summer (1904–05) the Argentine Government proposed to install a complete set of meteorological and magnetic instruments at the Penguin Islands. New Year's Island has also been equipped by Argentina. Cape Pembroke, on the Falkland Islands, has recently been equipped and inspected by Mr. W. S. Bruce, in co-operation with the British Meteorological Office. M. Charcot, of *Le Français*, is at present carrying on observations on the west side of Graham Land. Captain Larsen left Buenos Aires in November for South Georgia, where a permanent whaling station is to be established. This station is to be supplied with a complete set of meteorological instruments by Mr. Walter G. Davis. The next few years will doubtless witness a very rapid development of our knowledge of Antarctic meteorology.

R. DEC. W.

MEAN TEMPERATURES OF HIGH SOUTHERN LATITUDES.—Dr. Hann has recently contributed to *Nature* (Jan. 5, 1905) the results of a calculation made by him of the mean temperatures of the higher southern latitudes, using data obtained by the recent Antarctic expeditions. The preliminary table is as follows:

South latitude	50°	60°	70°	80°
Yearly temperature.....	41.9°	28.4°	11.3°	−3.6°
January "	46.9°	37.8°	30.6°	20.3°
July "	37.2°	18.2°	−8.0°	−24.7°

Mean temperature of both hemispheres:

	JANUARY.	JULY.	YEAR.	ANNUAL VARIATION.
Southern hemisphere	63.1°	50.5°	56.5°	12.6°
Northern "	46.4°	72.5°	59.4°	26.1°
Whole earth.....	54.7°	61.5°	57.9°	6.8°

The mean temperature of the southern hemisphere was previously determined (by Perrel and Hann) to be 59°, from data up to 55° S. The recent observations in higher latitudes show that the southern hemisphere is about 3° colder than the northern. (The above data were originally in Centigrade degrees. They have been converted into Fahrenheit degrees, and given to the nearest tenth by the compiler of this note.)

R. DEC. W.

GEOLOGICAL BIBLIOGRAPHY FOR 1903—*Bulletin* No. 240 of the U. S. Geological Survey is devoted to the Annual Bibliography and Index of North American Geology, Paleontology, and Mineralogy for 1903. This useful work is compiled by Mr. F. B. Weeks, Librarian of the Survey. Heretofore these bibliographies have been prepared solely from publications received by the library of the Survey, but the present issue records and indexes many geological papers that under the earlier practice were not noticed in the bibliography.

GLACIAL ORIGIN OF CIRQUES.—Two papers read before the International Congress of Arts and Sciences at St. Louis, and recently published in the *Journal of Geology* (Vol. XII, 2d, 569–588), deal with the question of the glacial origin of Cirques in high mountains, with especial reference to the Sierra Nevada. One of the papers is by Willard D. Johnson, who tells how, as a topographer called upon to map a portion of the high Sierras, he was impressed with the marked difference in topography there as compared with that of mountains in unglaciated regions. He

found the upper valleys broadly open, with steep sides, so characteristic of cirques, and the grades of the valley bottom in steps, some of which had a backward or upstream slope.

The evidence suggested a process of basal sapping associated with former glaciation, but it seemed difficult to understand how a glacier resting against a rock slope, and drawing away from it, could undercut and cause the cliff to recede. Noticing the long crevasse which ran parallel to the amphitheatre wall a little way out on the ice—the *Bergschrund* of the Swiss mountaineer—it occurred to him that if this ran to the base of the ice it might offer an explanation of the puzzling phenomenon of cirque formation. Accordingly, he had himself lowered to the bottom of the Bergschrund, a depth of 150 feet, the last 20 or 30 feet of which had one wall of rock. Here was a chance for sharp frostwork, frequently repeated, with possibly daily alternations from freezing to thawing conditions, which would result in much "plucking," a veritable quarrying and excavation, by which the cirque head would be moved backward.

Since its first statement, in 1883, a large number of glacialists have applied Johnson's hypothesis in the field, and some have found it exceedingly useful in accounting for the topography of cirque regions, among these Dr. G. K. Gilbert, whose paper in the same number of the *Journal of Geology* applies the hypothesis to certain regions in the high Sierras. Gilbert finds numerous facts to substantiate the hypothesis, including the fact that the cirques in the region studied are steeper on the north side where running east and west, and on the east side where running north and south, these being the sides where the Bergschrund would be best developed, owing to the greater accumulation of snow in these protected situations. His paper is accompanied by a number of excellent pictures illustrating cirque conditions as applied to this hypothesis.

Gilbert, as well as others, is inclined to assign to glaciers an enormous power in cirque formation, cutting the great, deep amphitheatres and pushing the divides back. To others the vast amount of work postulated by the hypothesis seems incredible and to be accepted only when no other hypothesis can be considered possible. One result of such work of glacial excavation would be to supply an enormous quantity of rock fragments, both large and small, and cirque excavation on the scale proposed should be accompanied by great moraine accumulation; but, so far as the reviewer is aware, such correlated deposits have not been observed. It is true that glacier streams remove a large proportion of the drift supplied by the melting ice; but even mountain torrents would not remove the large fragments resulting from plucking, and these fragments should be especially abundant if, as Johnson says, "the line of most rapid advance in the glacier mass is from near the bed, at the rear, to the surface, near the front." R. S. T.

Effect of Debris in the Advance of Glaciers.—The reasons why the fronts of some glaciers are now retreating, others advancing, and why the rates of advance and retreat of glaciers vary, even in a single area, are now engaging the attention of numerous students of glaciers and glacial action. Doubtless the reasons for these variations are numerous and their interaction complex. One cause for difference in rate of ice advance or retreat, not ordinarily considered, is discussed in a recent paper by I. H. Ogilvie (The Effect of Superglacial Debris on the Advance and Retreat of Some Canadian Glaciers, *Journ. Geol.*, Vol. XII, 1904, pp. 722–743). His point is that under conditions otherwise identical glaciers thickly covered with rock debris, and thus in a measure protected from melting, will show a less measure of retreat than glaciers with less debris. Applying this to specific cases, he concludes that debris

covering is responsible for the advance, and, in fact, for the continued existence of the glaciers of the eastern Rockies.

In his description of individual glaciers, Ogilvie calls attention to the peculiar form of the front of the Victoria glacier, which does not face directly down the valley but diagonally across it, the ice-front facing northwest. This he interprets as the result of the direction at which the summer sun strikes the glacier, so that the form of its front is determined by the position of maximum melting, not by the direction of motion. R. S. T.

NEW PHYSIOGRAPHIC TERMS.—With the development of the scientific description and interpretation of land-forms authors have deemed it necessary to introduce a large number of new terms, most of which have died at birth, while some, being much needed and admirably adapted to the needs, have survived, and found permanent adoption into the geographic nomenclature. Prof. Salisbury (*Journ. Geol.*, Vol. XII, 1904, pp. 707–713) has found the need of three new physiographic terms: (1) topographic unconformity; (2) topographic adjustment, and (3) superimposed youth.

By "topographic unconformity" is meant "greater topographic age on the upper part of a slope and lesser topographic age on the lower part of the same slope, with a distinct line or belt of separation between the two." The less common case of younger topography above, and older topography below, would also be topographic unconformity. Streams that have adjusted their courses to the weaker strata Salisbury proposes to call in "structural adjustment;" streams whose profile is adjusted to existing conditions he would call in "topographic adjustment;" and streams not so adjusted he would call in "topographic non-adjustment." His third name, "superimposed youth," is applied to those conditions where an older topography has for some reason had its drainage features so changed that a system of young stream valleys is developed over, or superimposed on, the older topography. For example, the drift-sheet left by the continental glacier over a mature topography has, over wide areas, caused the development of younger streams in the drift, and even in the under rock, forming gorges, waterfalls, swampy tracks, and lakes in regions whose rock topography is distinctly too mature for such valley conditions. Salisbury suggests that if other causes for such superimposition should make it necessary, this condition resulting from glaciation might be called "glacially superimposed youth."

These new terms undoubtedly indicate a need which other physiographers besides Prof. Salisbury have felt. It is a pity, however, that less-cumbersome terms could not have been found to meet this need, for it is probable that many workers will prefer the circumlocution necessary, without definite names in the employment of such terms as "topographic non-adjustment" or "glacially superimposed youth.' It is, at best, difficult to secure the adoption of new terms, even when needed; and it is true that the ones which have been most thoroughly and acceptably adopted are those that are terse as well as descriptive. "Glacially superimposed youth" does not possess the merit of *peneplain*, *monadnock*, *grade*, or even of *river pirate*.

R. S. T.

THE CYCLONIC ELEMENT IN CLIMATOLOGICAL SUMMARIES.—The usual climatological summaries, which give the averages of the different elements by the year, or month, or day, do not emphasize the importance of the cyclonic and anti-cyclonic controls of our weather. The cyclonic and anti-cyclonic units are irregular in time and duration of occurrence; therefore, they are lost sight of in averages for definite periods. It is obvious that, in order to obtain a rational and vivid picture of the actual climatic conditions of places in the latitudes of the stormy westerly winds, we should, in some way, make the cyclonic and anticyclonic units a basis of averages.

A suggestion to this effect was contained in a paper read by Prof. R. DeC. Ward at the Eighth International Geographic Congress in Washington last September (*Suggestions Concerning a More Rational Treatment of Climatology*). Proceeding along very much the same lines, Dr. W. N. Shaw, F.R.S., presented a paper on *The Treatment of Climatological Observations*, before the Scottish Meteorological Society, in Edinburgh, December 6, 1904. The importance of the subject is so great that a summary of Dr. Shaw's paper may well be given here.

The practice of summarising observations in the form of weekly and monthly means and extremes is convenient, and the results for some purposes valuable; but since the actual weather of the British Isles does not arrange itself in such regular periods, a system of classification which deals with consecutive weekly or monthly divisions as homogeneous leaves something to be desired for certain problems. The distribution of barometric pressure from day to day may be adopted as a basis of classification, and the object of the inquiry, towards which Dr. Shaw's paper is a contribution, was threefold:

First, to combine the climatological data in such a way as to exhibit effectively the modifying influence of geographical position upon the general weather conditions of the locality. Second, to mark out in clear outline and give numerical expression to the specific characteristics of weather associated with distributions of pressure which may be regarded as typical. Third, to secure the co-operation of the observers at the normal climatological stations in filling the outline by putting together the data for their stations, as they are obtained, upon some plan organized by mutual agreement.

Six different types of pressure distribution may be distinguished in the British Isles:

I. S. E. Type.—A pressure distribution favourable for S. E. winds, or, according to the amount of incurvature, for E. winds.

II. S. W. Type.—For winds from S. W., or from some point nearer S.

III. N. W. Type.— " " " N. W., " " " " " " W.

IV. N. E. Type.— " " " N. E., " " " " " " N.

V. Variable Cyclonic Type, with the sequence of winds incidental to the passage of a cyclonic depression.

VI. Variable Anticyclonic Type, with the uncertain winds of the interior of an anticyclonic region.

This is, of course, not an exhaustive classification; indeed, each of the first four types may be conveniently subdivided into three, according as any station is in a position where the isobars are concave towards the low-pressure area, nearly straight, or concave towards the barometric maximum. So far the inquiry has extended to groups of stations in the districts named, and for the periods indicated in the following table, which gives the number of days in the different periods that might be referred to the several types:

TYPE.	ENGLAND N. W. 1896–1898.		MIDLAND COUNTIES. 1897–1899.		SCOTLAND E. 1897–1899.
	JANY.	JULY.	JANY.	JULY.	JANY.
I. S. E.	13	2	11	7	11
II. S. W.	40	35	32	19	43
III. N. W.	18	28	12	27	18
IV. N. E.	13	6	14	13	5
V. Variable Cyclonic	7	8	5	6	5
VI. Variable Anticyclonic	2	14	19	21	11

The data for the first two districts were for periods with only two years in common; but the January data for Scotland E., and for the Midland Counties of England, for one and the same period, showed a relative preponderance of the S. W. and N.W. types in the more northern district, and represented definitely a difference of climatic conditions for the two districts. The weather of each station in each group has been analyzed as regards rainfall, temperature, etc., and the results gave a definite measure of the peculiarities of any place or district for any type of weather. Altogether the method of distributing the observations according to weather types brought out a number of striking points which would be masked or obliterated if only weekly or monthly averages were used. The student of meteorology is able to get

a much clearer and more definite insight into the facts of meteorology by bringing to the numerical test a number of statements which have long been recognised in a more vague and general form.

Such work is necessarily laborious, but may be lightened by the co-operation of observers in the various districts. R. DEC. W.

A CHINESE MAP OF THE WORLD.—Dr. Ahlenius publishes a description of a map of the world that has been discovered in the University library at Upsala, Sweden. It was compiled by the Belgian Jesuit Ferdinand Verbiest, and bears his Chinese name, Nan-Hoei-Gin, and that of the Emperor, Kang-Hsi (1661–1722), by whom he was appointed Director of the Astronomical Academy in Peking. Verbiest had exceptional opportunities for acquiring information about the Chinese Empire, as he accompanied the Emperor on his journeys into Manchuria and Mongolia. His map is drawn on the stereographic projection, the degrees on the Equator being marked eastwards only, and not east and west from the first meridian through Peking. The material seems to be taken from Mercator, Ortelius, Thévenot, Sanson, Blaeu, and other cartographers. China, Manchuria, Mongolia, and Central Asia are laid down from Verbiest's own observations and investigations. The Amur River flows into the Fretum Anian, the mythical strait between Asia and America. Strange to say, New Zealand is represented as an island, though it was proved to be so only in 1769 by Cook. The nomenclature was apparently first put in a Latin form and then transliterated into Chinese (*Geog. Jour.*, Vol, XXIII, No. 6, p. 791).

POLAR REGIONS.

PEARY'S COMING EXPEDITION.—Commander Peary is now very busy with preparations for his return to North Greenland, to resume his efforts to explore the Arctic Ocean north of America and to reach the North Pole. His vessel, which is under construction at Bucksport, Me., embodies the best ideas yet evolved as to model, strength, and general fitness for polar navigation. She will be completed about May 1, and will come to New York to take on supplies, which will be in sufficient quantity for three years.

Peary will start for Greenland early in July, and expects to reach Cape Sabine in about a month. He intends to utilize the Arctic Highlanders more than has ever been done before, and will have a large number of dogs, upon which he will depend to haul his sledges over the frozen ocean. On his way up the Smith Sound and other channels he will probably plant supply depots at Cape Frazer, Cape Lawrence, and Lady Franklin Bay (Fort Conger). He hopes to start on his sledge journey over the sea-ice in February next, and to reach the pole and be back at his land-base some time in June, 1906.

RELIEF FOR THE FIALA EXPEDITION.—Mr. Champ, the secretary of Mr. Ziegler, whose North Polar Expedition, under the command of Mr. Anthony Fiala, has not

been communicated with since it entered the ice of Barents Sea nearly two years ago, has returned from Europe after completing arrangements for the relief expedition. Mr. Champ purchased the Dundee sealer *Terra Nova*, which took part in the British expedition that brought Captain Scott's party home from the Antarctic regions. He also chartered the *Belgica*, well known for her work in the Antarctic.

The *Terra Nova* will sail from Norway about the second week in May, and simultaneously the *Belgica* will sail from Iceland. Both vessels will be bound for Franz Josef Land, which was to be the base of Fiala's operations. By choosing two routes of approach to that archipelago it is hoped that one of the vessels at least may get through, last year's relief party having been unable to make way through the pack-ice of Barents Sea.

PERSONAL.

Prof. Raphael Pumpelly was elected President of the Geological Society of America at its recent meeting in Philadelphia.

Sir John Murray has received the Count Lütke medal of the Russian Geographical Society; and has also been elected Honorary Member of the Geneva Geographical Society in place of the late Sir Henry M. Stanley.

Dr. George P. Merrill was elected President of the Geological Society of Washington and Waldemar Lindgren and A. H. Brooks Vice-Presidents, at the twelfth annual meeting of the Society.

Mr. A. Silva White, formerly Secretary of the Royal Scottish Geographical Society, has been appointed Assistant Secretary of the British Association.

Prof. Dr. Josef Partsch, of Breslau, will succeed the late Friedrich Ratzel as Professor of Geography at the University of Leipzig, beginning his duties in the summer semester of this year.

OBITUARY.

Dr. Alpheus S. Packard, Professor of Zoölogy and Geology at Brown University, died on February 14 at the age of sixty-six years. His writings were very numerous, especially in the field of entomology. Among his works of special interest to geographers were "The Mammoth Cave and its Inhabitants," "Observations on the Glacial Phenomena of Labrador and Maine," "A Naturalist on the Labrador Coast," and many geological papers.

NEW MAPS.

AMERICA.

UNITED STATES.—Geologic Atlas of the United States. No. 114. De Smet Folio. South Dakota, 1904.

In the central part of the State, on the east slope of James River Valley, extending between Latitudes 44° and 44° 30′ N. and Longitudes 97° 30′ and 98° W. Area about 857 square miles. Its features are chiefly those of subdued glacial topography, the basins being shallow and widely separated, the swells very low, and most of the surface covered with glacial deposits. The quadrangle contains no valuable mineral or coal deposits, no streams furnish water the year round, and the artesian supplies are apparently declining.

No. 116. Asheville Folio. North Carolina–Tennessee. 1904.

It extends between Longitudes 82° 30′ and 83° and Latitudes 35° 30′ and 36°, containing 968.70 square miles. The quadrangle is nearly all included in the mountain division of the Appalachian province. A bit of the northwest corner is in the Great Valley, and consists of low, rounded hills and shallow valleys; but nearly the whole quadrangle is occupied by mountain chains with broad plateaux and deep, narrow valleys. The drainage is mainly into the French Broad and Pigeon Rivers. Among the useful rocks are granite for building, abundant material for constructing roads, marble, and limestone suitable for making lime. The resources in water-power are very great.

UNITED STATES.—Alaska: Juneau Special Map. Topographic Sheet. Scale, 1:62,500, or 0.9 miles to an inch. Geological Survey, Washington, D. C., 1904.

This is interesting as one of the first detailed topographic sheets of any part of Alaska. These surveys are now being carried out at a number of the most important mining centres. As Juneau is one of the best-known mining regions, this map, giving its topography by contours, will be of special interest to many persons. The results of the Canadian Survey on the north and east are included on the sheet. They are not so detailed as those of our own Survey, as the contour interval in the Canadian area is 500 feet, but only 100 feet in the Alaskan area.

NEW YORK.—Map of the Hudson Valley between Hoosic River and Kinderhook Creek. Scale, 1:127,000, or 2 statute miles to an inch. Contour interval, 40 feet. By T. Nelson Dale. U. S. Geological Survey, Washington, 1904.

Illustrates *Bulletin* No. 242. "Geology of the Hudson Valley between the Hoosic and the Kinderhook." Five symbols to show geological formations. Fossil localities and chief outcrops indicated.

KANSAS.—Geologic Map of the Iola Quadrangle, Kansas. Showing location of oil and gas wells in September, 1903. Scale, 1:125,000, or 1.9 statute miles to an inch. Contour interval, 20 feet. U. S. Geological Survey, Washington, 1904.

Illustrates *Bulletin* No. 238. "Economic Geology of the Iola Quadrangle, Kansas." Fifteen symbols for rock formations; locations of oil wells, gas wells, and dry holes shown. The quadrangle is in the prairie region, and the rock formations are interstratified shales, sandstones, and limestones. There were 725 producing oil wells at the end of June, 1903. The gas-producing territory extends about nine miles east and west and 4 miles north and south in the Iola-Laharpe region, and has supplied much more gas than any other field in the State. Attracted by this cheap fuel, zinc-smelting companies erected large smelters in the Kansas gas fields, and more than one-half of the spelter produced in the United States is smelted by Kansas gas, much of it by smelters within the Iola Quadrangle.

PORTO RICO.—The Luquillo Forest Reserve. Scale, 1:190,080, or 3 statute miles to an inch. U. S. Department of Agriculture, Washington, 1905.

This forest reserve was set apart by Presidential proclamation on Jan. 17, 1903. The reserve is in the east part of Porto Rico, and covers a large portion of the Sierra de Luquillo, a mountain mass separated from the mountains of the rest of the island by the valley of the Rio Grande de Loiza, the largest river in Porto Rico. The reserve contains much land under cultivation, chiefly coffee farms. Less than 30 per cent. is Government land. The Federal forest land, 20,000 acres, is in almost a solid block. The purpose is to make good roads and to develop and conserve the timber resources, the idea being that the sales of charcoal, timber, and gum may ultimately make the reserve self-supporting.

WEST INDIES.—Carte Sismique de la Méditerranée Antillienne. Scale, 1:5,600,000, or 88.3 statute miles to an inch. Government of Mexico, City of Mexico, 1904.

The map appears in Vol. XIX, Nos. 11–12 of *Memorias y Revista* of the Scientific Society "Antonio Alzate." It illustrates a paper in French by Mr. F. de Montessus Ballore on the seismic-geological relations observed among the West Indian Islands. Isobaths show the depths of the surrounding waters, coast-lines on which seismic waves have been recorded are distinguished from other coasts, and the number of earthquake shocks on record at each centre of seismic disturbance is shown.

BOLIVIA.—Plano de la Ciudad de La Paz. Scale, 1:4,000, or .056 statute mile to an inch. Levantado por la Comision Topográfica, La Paz, 1902.

The scale is sufficiently large to show the outlines of the buildings. The positions of 55 of the public buildings, schools, hospitals, theatre, churches, etc., are noted.

EUROPE.

AUSTRIA-HUNGARY.—Eisenbahn- u. Postkarte von Oesterreich-Ungarn. Scale, 1:1,500,000, or 23.67 statute miles to an inch. Artaria & Co., Vienna, 1905. (Price, K. 2.20.)

The fifth edition of this standard railroad and postal guide of Austria-Hungary. It shows all railroads, steam or electric, wagon roads in the postal service, railroad stations, the distance between junction stations, and gives much other information required by travellers. Insets on larger scales show northwestern Bohemia, where railroad stations are closer together than in most other parts of the empire, and maps of Vienna, Prague, and Budapest, showing railroad depots and the suburban service. An index of 30 pp. makes it easy to find all railroad stations on the map.

BELGIUM.—Carte des chemins de fer, routes et voies navigables de la Belgique. Scale, 1:320,000, or 5 statute miles to an inch. Publiée par l'Institut Cartographique Militaire. Brussels, 1904.

Shows the political subdivisions by colours, railroads, canals, navigable and unnavigable streams, etc., up to date. The map is also ruled into squares indicating the limit of the sheets on the large scale, 1:20,000, Government map. This sheet is convenient to handle, and gives a large amount of information.

CYPRUS.—A Geological Map of Cyprus. Scale, 1:348,480, or 5.5 statute miles to an inch. Compiled by C. V. Bellamy. (With 16 pp. key.) Edward Stanford, London, 1905. (Price, 6s.)

Though intended primarily to illustrate the geology of Cyprus, it is also a superior map for general purposes. The nomenclature is full but not crowded, as the scale permits the use of many names. Carriage roads, bridle paths, monasteries, and ruins appear, and Christian villages are distinguished from Moslem villages. Many elevations are given in English feet.

Five colours show the distribution of geological formations. The oldest strata are the Trypanian * limestones, assigned to the Cretaceous Age, and the foundation on which the later rocks were laid down. These limestones apparently were a part of a land surface during most of the Eocene Period; then came the subsidence of this land, and it was covered by the sandstone shales that are referred to the latest part of the Eocene.

Above this second or Kythraean (named from Kythræa) series are the Oligocene

* Local definition, derived from Trypa Vouno, a summit of the Kyrenia Range.

marls, containing gypsum and alabaster, proving that the subsidence continued until the water was of great depth and deposits similar to modern oceanic oozes were formed.

An epoch of volcanic disturbance, accompanied by general upheaval, brought the subsidence to an end. The Pliocene strata of Cyprus rest unconformably upon the older rocks, and belong to the younger members of that series, so that here is indicated a second break in the geological history of the island. During this interval, and at a time corresponding with the early Pliocene stage, the igneous rocks appear to have emerged and the mountain ranges came into existence. Only their summits showed above the surface; they were groups of islands, now the Troados Mountains on the south and the Kyrenia Hills on the north. Beneath the waters of the Pliocene Sea surrounding these islands the sandstones, conglomerates, and associated strata, all fruitful in fossil remains, were being deposited. Finally the receding waters revealed the island and introduced the Pleistocene Period. Later came high elevation and torrential floods, which were responsible for much of the land sculpture, and changed the physical aspect of the country into the condition in which it is now found.

IRELAND.—Bartholomew's "Quarter Inch to Mile" Map of Ireland. Scale, 1:253,440, or 4 statute miles to an inch. Roads revised by the Cyclists' Touring Club. The Edinburgh Geographical Institute, 1904. (Price, paper, 1s.; cloth, 2s. per sheet.)

The seven sheets of this map are among the latest products of Bartholomew's map house, and they will please all who appreciate good taste, clearness, and accuracy. They make a fine map of Ireland for any purpose, though specially intended for tourists. Roads are distinguished as main roads, secondary roads, and footpaths. The driving and cycling roads are shown in brown, and the land is coloured according to contours of elevation. Roads that are not coloured are not recommended to cyclists. Inns, hotels, fishing-streams, lakes, woods, forests, antiquities, etc., are also indicated.

SWEDEN.—Karta öfver Sveriges Jernvägar och med Statsbidrag byggde Landsvägar och Hamnar (Sheets 1 and 2). Scale, 1:1,000,000, or 15.7 statute miles to an inch. Contributions to Swedish Official Statistics, No. 32. Stockholm, 1904.

A map of the transportation routes of Sweden. It shows all the land and water-routes, including roads; marks the anchorages and the head of navigation on rivers, and indicates routes in operation, those that are being constructed, and projected lines. An inset on the larger scale of 1:700,000, or 11 statute miles to an inch, gives somewhat more detailed information of the extreme southern part of the country south of Engelholm. Sheet 2 shows the route of the Luleå-Ofoten-Fiord railroad, most of it north of the Arctic Circle, on a larger scale than in previous maps. It is to be regretted that in so finely-executed a map no topographic feature excepting hydrography is shown.

AFRICA.

SOUTH AFRICA.—Geological Survey of a portion of the Pretoria and Middelburg Districts. Scale, 1:148,920, or 2.3 statute miles to an inch. Geological Survey of the Transvaal. *Report* for 1903, Pretoria, 1904.

The *Report* which this map accompanies deals with the first year's work in the field by the Geological Survey as reorganized by the British. It was decided first to examine and map some line of country that would traverse a number of the more important formations and groups of rocks, so that the geological information obtained

would be as varied as possible. The total area mapped during the season amounted to 1,138 square miles. This map of the larger part of the district surveyed shows geological formations in thirteen colours, together with the direction of dip of strata, boundaries of formations, fault-lines, glacial striæ, anticlinal axes, mines, etc.

SOUTH AFRICA.—Railway Map of South Africa. Scale, 1:3,864,960, or 61 statute miles to an inch. Published by authority by *South Africa*, London, 1905.

The latest railroad map of South Africa, showing railroads in operation, in construction or authorized, proposed railroads, coach-routes in connection with train service, carrier-routes in Rhodesia, and telegraph lines. All railroad stations are indicated, and there are eight insets of the leading ports, others of suburban lines at Cape Town, Pietermaritzburg, and Durban, and an inset of Africa showing the Cape to Cairo route. This route, however, north of Broken Hill, in Northeastern Rhodesia, is likely to be modified.

SOUTH AFRICA.—TRANSVAAL. Standard Map of the Witwatersrand Gold Fields. Scale, 1:40,000, or .6 statute mile to an inch. (3 sheets.) By Frank Flowers, C.E. George Philip & Son, Ltd., London, 1904. (Price, paper, £3, 3s.; cloth, in case, £4, 4s.)

Shows the reef outcrops, geological faults, gold properties, names of estate owners, water-rights, bore-holes, and gives other information concerning the part of Witwatersrand within range of the mining operations. Insets show parts of the mining districts on an enlarged scale, and also a plan of the mining and magisterial districts, given in detail on the three sheets. The map is well engraved, and is important for all who are practically interested in the mining region around Johannesburg.

ASIA.

RUSSIAN CENTRAL ASIA.—Übersichtskarte des Zentralen Tian-Schan zur Veranschaulichung der Reiserouten der Merzbacherschen Expedition in den Jahren 1902 u. 1903. Scale, 1:1,000,000, or 15.7 statute miles to an inch. Petermanns Mitteilungen, Ergänzungsheft, No. 149, Justus Perthes, Gotha, 1904.

The map shows the Tian Shan Ranges, between Longitudes 76° and 83° E. It is based upon the Russian 40-verst map, and gives the route surveys and other observations made by Dr. Gottfried Merzbacher's expedition. After seeing the Tian Shan mapped only on small atlas sheets, this comparatively large-scale map of the central part of the chain gives a vivid impression of the vast area covered by these snow-topped mountains, and of the enormous spread of glaciers on all sides of the high mountains and along the flanks of the chain. The map, however, is intended chiefly for the readers of Dr. Merzbacher's preliminary report, and another delineation of the mountains will take its place as soon as the explorer's surveys, determinations of heights, and geographical positions have been worked out, so that a definitive map may be made. With the map are two remarkable photographic panoramas obtained during the journey.

AUSTRALIA.

AUSTRALIA.—Geological Sketch Map of the Country in the Vicinity of Sydney. Scale, 2¼ statute miles to an inch. Prepared under the direction of E. F. Pittman, Government Geologist. Department of Mines and Agriculture, Sydney, 1904.

Illustrates a paper on some of the dykes and volcanic necks of the Sydney district appearing in *Records* of the Geological Survey of New South Wales, Vol. II., Part 4. Geological formations, and positions of dykes and other volcanic phenomena are shown in colours.

BOOK NOTICES.

The Guide to South Africa.—Twelfth edition. lxiv and 477 pp., 14 maps, 2 diagrams, and index. Union-Castle Mail Steamship Co., London, and 8 and 10 Bridge Street, New York, 1904. (Price, 2s. 6d.)

This book is full of information for tourists, sportsmen, invalids, and settlers. It is evident that care has been taken to make the compilation accurate. Sportsmen may find, for example, all details concerning hunting equipment, varieties of game, the game laws, and the regions where game may still be found. Farmers may learn of the distribution of agriculture, the nature of soils, the crops, forests, live stock, facilities for irrigation, and regulations for the sale of lands. All points of interest to tourists, routes of travel, hotel accommodations, and other information receive full attention. The maps and town plans, prepared by George Philip & Son, London, are very satisfactory specimens of cartography. Some of the routes described extend into the British Central Africa Protectorate.

Life in Canada. By Thomas Conant. vi and 290 pp. and 27 illustrations. William Briggs, Toronto, 1903. (Price, $1.50.)

The author makes some interesting contributions to the history of Canada, chiefly Ontario, and to our knowledge of the manners and customs of its inhabitants in the century beginning in 1792, when his ancestors settled in the country. His book throws light on the pioneer days of nineteenth century development; and this record of the early struggles, the hardships, the perils, the sturdy courage, and virtues of our friends across the Border will interest us almost as much as the similar experiences of our forefathers.

In those early days the settler in Ontario often saw the work of the industrious beaver. The value of all other furs was made by comparison with a beaver skin. Salt-water salmon at that time swarmed in Canadian rivers. In November they ascended the streams for spawning, and they were often caught in Lake Ontario. Of course, they were not found above Niagara Falls. Wolves were a terrible pest, and the Government paid a bounty of about $6 for each wolf's head. Thomas Conant, the author's grandfather, in 1806, spent an evening at the home of a young woman with whom he was "keeping company," and about midnight set out for his home, three miles away. A pack of wolves in full cry were soon upon him, and he saved his life only by climbing a beech tree, where he spent the rest of the night with the animals howling around him. Slavery existed in upper Canada till 1793, when it was abolished. There were not many slaves, but no compensation was paid to their owners. In his travels the author thinks he has seen no country that so much resembles Ontario as the plains of Hungary, near Budapest. It was difficult for the early settlers of Ontario to pay for their farms, because there was little market for their produce; money was extremely difficult to get, and even if there had been markets a farm was unproductive until cleared of timber, so it was harder to pay $4 an acre then than $80 to-day. The book is well illustrated.

Südamerika und die deutschen Interessen. Von Dr. Wilhelm Sievers. 95 pp. Strecker & Schröder, Stuttgart, 1903. (Price, m. 2.70.)

This monograph is an authoritative summary of South America in its racial, political, and economic aspects. Dr. Sievers says that South America, since the

middle of the last century, has lagged behind the other continents in geographical research and the study of its resources and commercial possibilities, because Africa, after 1850 and especially after 1880, nearly monopolized the interest of the European Powers, six of which divided practically the whole continent among themselves. When there was nothing left in Africa to distribute, the chief interest of Europe turned to Asia, where Russia had been extending her domain since the middle of the 19th century; while Great Britain, France, and Germany, and also the United States, have acquired new fields within a few years.

The first chapter treats of the political development of South America, its population, including the German, Italian, Negro and Chinese elements, as well as the Spanish, Portuguese, and native Indian, and the influence each has exerted. The author then describes the material progress, great mining development having preceded agriculture on a large scale. The largest tropical agricultural products are coffee, cacao, and sugar, cotton and tobacco playing a subordinate rôle. In subtropical South America (Argentina, Uruguay, and central Chile), the progress of agriculture in recent years has been remarkable. Peruvian bark and coca have a place between agriculture and forest products, among which rubber and Paraguay tea (Mate) are most important, while the timber and other forest products are as yet comparatively little utilized. The manufacturing industries and commercial conditions are discussed in all their leading features. Sixty-one pages are given to these various phases of the continent, and the next 28 pp. to the relations of Germany with each of the states. Dr. Sievers says that, without doubt, the soil of South America is more productive than that of Africa, Australia, or even Asia. It has no great areas of uncultivable lands, such as the wastes of Africa, Australia, and Asia; its mineral wealth is unsurpassed; its tropical forests are unequalled, and no other continent has so large a mileage of navigable rivers. The writer regards the advent of large commercial and industrial interests from Europe as promising a new era in development; and he believes it to be within the power of Germany to take a very prominent part in the progress of the continent.

Beschreibung Ägyptens im Mittelalter, aus den geographischen Werken der Araber. Zusammengestellt von Else Reitemeyer. 238 pp. No index. Dr. Sevele & Co., Leipzig, 1903.

An uncommon and noteworthy book. Its contents were selected from the works of Arab geographers who wrote between 891 and 1526 A.D. A chapter on the Nile, for example, is made up of the compiler's translation of extracts from the writings of a number of these chroniclers, the name and period of each writer being given. They tell of the sources of the Nile, its floods and low water, irrigation canals and other features. The flora and fauna of Egypt, its ancient history, its cities, soils, and products, are among the topics treated in the other chapters.

Some of the most interesting pages describe ancient monuments that have since been destroyed or mutilated by time or vandalism. The book is, on this account, of much archæological interest. The compiler remarks in the preface that when the reader finds in this volume errors and fantastic explanations mingled with many statements that were true, he should not forget that we cannot measure these writers by standards we apply to writings of the present day; and that the value of these Arab descriptions is increased by the fact that they connect Egypt in the earlier part of the Christian era with Egypt of modern times, and give much information of value about a period of which we know very little from other sources.

Japan in the Beginning of the 20th Century. viii and 827 pp. No index. Imperial Japanese Commission to the Louisiana Purchase Exposition, Tokyo, 1904.

An official and exhaustive work, compiled in the various departments of the Japanese Government for foreign readers, and of value to all who wish to acquaint themselves with the material condition of Japan. It deals with geography, population, government, and land system of the empire; with the primary industries of agriculture and stock-raising, mining and the fisheries; with the manufacturing industries, their encouragement and protection, and industrial education; with the foreign trade, finances, currency, and banking; with communications by post, telegraph, and telephone; and with transportation and education. A supplement of 50 pp. gives similar information concerning Formosa.

The section on the geography of Japan is little more than a bare summary of the orographic and hydrographic features, their position, and extent, and of the leading towns and ports of the country. Heights are given in terms of the Japanese *shaku*, which, however, is so nearly equivalent to 1 foot (.994) that heights expressed in this denomination may be used by readers of English without much difficulty. The geology of the empire is treated in a chapter on minerals, but is chiefly confined to the economic aspects of the subject.

Europe and the Far East. By Sir Robert K. Douglas. viii and 450 pp., 2 black and 2 coloured maps and index. The University Press, Cambridge, 1904. (Price, 7s. 6d.)

This volume is one of the Cambridge Historical Series, the aim of which is "to sketch the history of modern Europe with that of its chief colonies and conquests, from about the end of the fifteenth century down to the present time." Prof. Douglas's contribution deals with the relations between the European nations and the countries of China, Japan, Annam, and Siam. In a book of medium size like this it is, of course, necessary to treat in a summary manner a great deal of the information given on so large a topic, but Prof. Douglas's style is animated and his narrative is interesting. He treats each of these eastern countries separately in their relations with Europe, and gives considerable attention to their physical features, natural resources, and means of communication, all of which have their influence upon the political, philanthropic, and other relations between Europe and the East which he unfolds. He appends a long bibliography for those who desire to extend their studies, and has this to say about the use of the hyphen in Chinese names:

> The use of the hyphen in Chinese words is often misleading. It used to be the habit to separate each syllable of a Chinese name by a hyphen, which is no more necessary than it would be to write Win-chester or Peters-burg. This usage is gradually becoming obsolete. We now write Peking instead of Pe-king, Shanghai instead of Shang-hai; and the old practice, where unnecessary, will, no doubt, die out in time.

A short article on Chinese geographical terms gives the meaning of a considerable number of syllables or words that are much used in Chinese place-names. The book will be very helpful to those who seek to interpret recent events in the light of the causes which led up to them.

A Russo-Chinese Empire. (An English Version of "Un Empire Russo-Chinois." By Alexandre Ular. xix and 301 pp. and index. Archibald Constable & Co., Ltd., Westminster, 1904. (Price, 7s. 6d.)

This political essay is based upon the history of events in East Asia within the past 40 years, and especially upon the Russian advance on China, by which, accord-

ing to the author, the Russian Government was able practically to annex Manchuria and Mongolia, and entertained the ultimate purpose of incorporating at least the north of China in the Russian Empire. He writes of the Chinese with sympathetic appreciation of their virtues, defends them against those who say they have a low standard of civilization, and takes a wholly anti-Russian view in his account of the expansion of Russia in the Far East. He undoubtedly presents many facts that have escaped general notice in the Occident.

Dans les Rapides du Fleuve Bleu. Par le Lt. de Vaisseau Hourst, iii and 363 pp., 50 illustrations and a map of Szechuan. Plon-Nourrit & Co., Paris, 1904. (Price, 10 fr.)

Lieut. Hourst, the first man to descend the Niger from Timbuktu to the ocean, successfully made the ascent of the Yangtse rapids in October, 1901, on the French gunboat *Olry*, which, although not very well adapted for her dangerous journey, got through the gorges above Ichang and steamed farther up the river than the British vessels which had preceded her. The Germans attempted to make the same journey in 1900, but their steamer, the *Sui-hsiang*, was wrecked on a reef, and Capt. Breitag was drowned.

The book is a popular and vivacious description of Lieut. Hourst's triumph over these dangerous rapids. It is well illustrated, and abounds with entertaining incidents and anecdotes. It is to the author's credit that he succeeded in making a triangulation of the river through the rapids between Ichang and Chungking, 395 nautical miles, and between Chungking and Suifu, 230 nautical miles. This survey will be of value for the navigation and more accurate mapping of the river.

Een Jaar Aan Boord H. M. Siboga. Door Mevrouw A. Weber-van Bosse. (Second Edition.) xi and 335 pp., numerous half-tone pictures and a map. No index. E. J. Brill, Leiden, 1904. (Price, fl. 1.50.)

For readers of Dutch this is a delightful book. It is a description of a year's cruise on the deep-sea exploring vessel *Siboga* in the Indian Archipelago in 1899 and 1900. It was a voyage covering 12,000 sea miles, and was very fruitful in biological collections, and additions to our knowledge of a wide area of the sea-floor. The leader was Prof. Max Weber of Amsterdam, who was accompanied by Madam Weber-van Bosse, herself an accomplished naturalist, who made a very complete collection of algæ during the cruise. The routine of scientific work on an exploring vessel is revealed, the methods and apparatus for making collections are described, and there are stories of visits to the islands and many amusing incidents that give variety to a cruise. The book is popular, and while the average reader cannot help imbibing considerable oceanography and biology, he is spared a large amount of scientific detail.

The New Nation. By Percy F. Rowland. x and 324 pp., 2 Appendices and index. Smith, Elder & Co., London, 1903. (Price, 7s. 6d.)

This is a sketch of the social, political, and economic condition and prospects of the Australian Commonwealth. The author spent seven years in various parts of Australia, and he has endeavoured to write a candid and impartial account of the young Commonwealth. His view of Australia, from her beginnings in the Convict Settlement to her present position as a great State among the nations, is full of enlighten-

ment and not without humour. He treats all phases of the elements and influences which gradually evolved the present Australia, sketches the political and social life on the ranges and in the mines and towns, and pictures the artisan, the state of culture and the position of education, art, the drama and literature. He studies the national characteristics, and presents a very clear and interesting view of the economic conditions and outlook. Mr. Rowland thinks the knighthoods and other honors conferred by the Colonial Office should be discontinued:

> Awarded as they are at present to all and sundry that happen to stand most in the public eye or secure the most effective political patronage, their effect on the sentiment of some of the more thoughtful of Australians towards England is little less than disastrous. The term C.M.G., for example, suggests to most loyal subjects in New South Wales nothing in the world so vividly as "Corner of Market and George Street"—the site of the public-house kept by a recipient of imperial honour some years since (p. 296).

The appendices contain a Report on the excessive hours of labour in Sydney shops and a Plea for English Literature in the primary schools.

Une Croisière au Spitsberg. Par Jules Leclercq. 111 and 282 pp., 30 photographic reproductions and a map. Plon-Nourrit & Co., Paris, 1904.

The story of the voyage of a tourist party on a comfortable yacht to Spitsbergen. This journey was once regarded as hazardous, and no women would tempt its perils. To-day, however, the voyage is looked upon as a simple affair. On this occasion eight women were among the forty-five passengers, who also included a number of scientific men bound for a summer vacation in the Arctic. The book is a very entertaining account of the voyage, which included not only the long coasts of southern and western Spitsbergen, but also the fiords and towns of northern Norway and a side trip to the coast of Lapland.

Stops were made at numerous points in Spitsbergen, and the author tells interesting and sometimes tragical stories associated with the history of a number of places. The modest cabin in which Andrée lived for the last four months of his life was still standing. It seemed to be awaiting his return, for everything about the place was in good order. The map shows the triangulation of the Russian and Swedish missions in their survey of an arc of the meridian, and the results of the work of other recent investigators.

Elemente der Terrainlehre des Kartenlesens und Croquierens. 41 pp. and table of cartographic symbols. F. West. Brody, Austria, 1904. (Price, 80 heller—about 40c.)

This little book is intended primarily for military surveying during a campaign, but it will be of value to advanced students of geography for its clear, comprehensive and systematic definition of the German words relating to orographic, hydrographic, and topographic forms and aspects, its helpful section on map-reading, and its directions for cartographic work in the field. The book is elementary, but is full of hints and information of use to readers of German who wish to familiarize themselves with map-reading and the elements of map-making.

Geschichte der Erdkunde. 1. Teil. Von Dr. Siegmund Günther. xi and 343 pp. and index of names. Franz Deuticke, Leipzig and Vienna, 1904. (Price, $2.90.)

Dr. Günther tells in this learned and exhaustive book of the ideas of the ancients concerning geography, and traces at length and with many references to authorities

the great isolated journeys, the eras of discovery, and the scientific progress of the study up to recent times. He indicates the scientific value of the work done in each period. This will be a most convenient and useful reference book, in which the work of each century and of all important explorers and scholars, in its main features and scientific outcome, may very conveniently be studied.

Lehrbuch der Geographie, von Herman Wagner. Siebente Auflage, Erster Band. Einleitung, Allgemeine Erdkunde. Mit 85 Figuren. Hannover und Leipzig, Hahn'sche Buchhandlung, 1903.

This volume of about 900 pages is a revised reprint of the sixth edition, which had been exhausted so quickly that no actually new edition could be prepared. In this case the demand for the book is a proof of its merits. It represents, indeed, the most complete compendium of the whole field of general geography, presented in an admirably brief and concise form. The introduction contains a bibliography of the geographic literature of the world (periodicals, reports, and proceedings of societies, cyclopedias, textbooks, maps and atlases, geographic names, publications of Government surveys, and on the teaching of geography); (2) a history of the science and its methodology from the earliest times to the present, and (3) a discussion of the concept and of the divisions of geography (36 pp.). The results of the latter appear in the arrangement of the geographical matter proper, which is treated in four "books": I, Mathematical geography (200 pp.); II, Physical geography (530 pp.); III, Biological geography (90 pp.), and IV, Anthropogeography (190 pp.). The arrangement of the subdivisions of these books is of especial interest as presenting another attempt at an exhaustive classification of our science, to which so much attention is paid at present in this country.

In BOOK I the first chapter deals with *orientation*, thus making the problem of location the starting-point of geography—viz., orientation (*a*) on the horizon, (*b*) in the sky, (*c*) on the earth's surface, (*d*) results of the preceding three—geographical location—including not only latitude and longitude, but also methods of surveying, triangulation, etc.

The second chapter deals with the *globe:* (*a*) shape and size, (*b*) physical properties (density, heat, magnetism, etc.).

Chapter three discusses the *motions of the earth:* (*a*) Rotation, (*b*) revolution summing up the results in (*c*) the solar system, and (*d*) effects of gravitation.

Chapter four is given over to the *geographic map*, treating (*a*) projections, (*b*) means of cartographic expression (contours, hachures, etc.), and (*c*) map-reading.

BOOK II is divided into four chapters: The surface of the earth, the land, the ocean, the air.

The chapter on the *surface of the earth* includes the general distribution of land and water, the continental slopes, coast-lines, etc.

The chapter on the *land* deals with (*a*) all the composition of the earth's crust, (*b*) crust movements, (*c*) external changes of the crust (especially erosion and deposition), (*d*) results of these changes, (*e*) surface-forms (mountains, valleys, plains, etc.), (*f*) lakes and rivers, (*g*) coasts and islands.

The chapter on the *ocean* has only three subdivisions: (*a*) Ocean spaces (level, size, depth, etc.), (*b*) sea-water, (*c*) movements of the ocean.

The chapter on the *air* treats: (*a*) temperature, (*b*) air-pressure and winds, (*c*) vapour and precipitation, (*d*) climate.

BOOK III discusses (*a*) the biosphere, (*b*) distribution of organic life, (*c*) general

results of migration and adaptation, (*d*) the vegetation of the land, (*e*) useful plants and animals.

BOOK IV treats : (*a*) the human race, (*b*) natural divisions of the human race, (*c*) cultural divisions of the human race, (*d*) States (political geography), (*e*) religions, (*f*) settlements and density of population, (*g*) ways and means of transportation, (*h*) commerce and traffic of the world.

The different sizes of the four books are striking illustrations of the inequalities of the development of scientific geography along the different lines of work. While the danger of identifying it with physical geography is less menacing in Germany than in this country, the book on physical geography is nevertheless the largest of all, and the most specified, proving that even in the Old World this is the field of geography which has been longest under the influence of scientific methods, and therefore is as yet richest in definite scientific results. Mathematical geography includes a great many topics which are not represented in American textbooks, but which are recognized throughout the country as part of the science and which will become parts of our college courses as soon as they are better developed. The subject-matter of this book has been well defined, anyway, for many years, and contributions to it, as far as the purely geographical matter is concerned, will hardly be made any more. It is not so with the contents of Books III and IV. Covering new, or very young, fields of geographic research, the material for them is as yet limited, and positive results are few—so few that in our textbooks the whole matter generally figures as an appendix to physical geographies. As a question of principle, it ought to be noted that the author has made each of these young branches, biogeography and anthropogeography, the subject of a book of its own, which, while small at present, is expected to grow up to the size of physical geography in due time. The task of classifying this new material, and of attempting a reduction of the new ideas set to work on it by Ratzel and others, to a few concise chapters which will enable the reader to get in a short time a brief, but complete, knowledge of the main points of this work, has been admirably performed, as it can be done only by one himself a scholar and an investigator, who gives of his own even where his intention is mainly to report on the work done by others. As a basis from which to start the further upbuilding of anthropogeography to as complete a structure as we know now that physical geography can be made, this division of the book will be of lasting value to the development of the geography of man.

Thus, according to Wagner, scientific geography of the future will consist of four equally important and well-defined parts—mathematical, physical, biological, and anthropogeography. These, however, represent only the first half of geographic science as a whole—namely, general geography. The second half, which is expected to become another volume of some 900 pages, is "Länderkunde"—viz., regional geography. That this, too, can be made the object of scientific work is a theory admitted by only few in this country, where the geography of the countries has so far been limited almost exclusively to the elementary school courses. Not so abroad, where the "special" geography is as much an object of the scholar's work as the "general." While general geography, according to Wagner, studies the general laws of distribution of natural and human phenomena all over the earth's surface, without special regard for the localities where they are found, special geography, or Länderkunde, makes those localities the centre of observation and defines the results of the co-operation of these laws as shown in those localities; or, in other words, in general geography, the laws are the principal things and the different regions figure in the study only as far as they serve to explain the working of the laws; in special geo-

graphy the regions of the earth are the principal thing, and the laws figure only as far as they explain the character of the regions.

There is then elementary geography, both special and general, for the schools, and there is scientific geography, both general and special, for the universities.

Two features that make the book of especial value as a reference book are the excellent special bibliographies which are given at the beginning of the chapters and the exhaustive index. The appendix contains a chronological table of geographic events from the oldest times to the present, lists of the most important geographic measures and their reductions to the metric system, and a table of the measures of parallels and square degrees in different latitudes according to Bessel's earth spheroid.

M. K. G.

The Opening of Tibet, an Account of Lhasa and the Country and People of Central Tibet, etc. By Perceval Landon, Special Correspondent of the *Times*. xvi and 484 pp., 48 full-page double-tone plates and a frontispiece in colour. Doubleday, Page & Co., New York, 1905. (Price, $3.80.)

The publishers of this American edition of a book, which sells for two guineas in England, announce in a circular that they have been impressed with the observation frequently made that the prices of net books are too high, and that, though they had the author's permission to omit many pages, they have retained the full book for the low price named.

It must be said that the work is presented in a style every way creditable to the De Vinne Press and to the publishers, who, it may be hoped, will not be led to regret their experiment.

In an introductory note Col. Younghusband commends Mr. Landon as a competent chronicler of what the Tibet Mission saw and did. Mr. Landon tells, with earnestness and fluency, the story, now somewhat monotonous, of the wicked foreigner and the virtuous Briton. There was in Lhasa a bad Russian named Dorjieff, who used his influence to make the Dalai Lama more anti-English than he was by nature, and the military mission to Lhasa was the result.

The story of the march and the opposition offered by the unreasonable Tibetans may be accepted in the absence of any statement from the other side, and the reader will turn with a sense of relief to Mr. Landon's descriptions of the wonderful scenery. The colour of Tibet, he says, has no parallel in the world—neither in Egypt, nor South Africa, nor at Sydney, nor Calcutta, nor Athens; and its crowning glory is the sunset.

The panorama of Lhasa is unique:

> There is nothing missing from this splendid spectacle—architecture, forest trees, wide green places, rivers, streams, and mountains all lie before one as one looks down from the height upon Lhasa stretching out at our feet . . . . there was nothing to promise us this city of gigantic palace and golden roof, these wild stretches of woodland, these acres of close-cropped grazing land and marshy grass . . . . a man can have no eye for anything . . . . but this huge palace-temple of the Grand Lama . . . . a marvel in stone, nine hundred feet in length and towering seventy feet higher than the golden cross of St. Paul's Cathedral. The Potala would dominate London—Lhasa it simply eclipses.

Mr. Landon speaks well of the people. Their courtesy was unfailing, and they entertained the stranger with the best they had to offer.

They do good work in metals, especially in brass, and their jewellery is exquisitely finished and suggestive of Byzantine work; but their most wonderful productions are their books—more beautiful, as Mr. Landon thinks, than those of any

other country. The book cover is of close-grained wood, in three panels, each carved in minute details, cut in quarter-inch relief. The cover is heavily gilt, and lined with silk, protecting the first page of the manuscript. This page is of a rich-glazed Prussian blue, with the opening words of the book in raised gold characters in a central inset panel. The next page has a miniature on the left, and then every page to the end of the book is painted in letters of gold, or alternately in lines of gold and silver.

Mr. Landon's chapters on Religion, Manners and Customs, Art, and Lamaism were, perhaps, imposed upon him by the nature of his subject. They are interesting in themselves, but the author fully acknowleges his indebtedness to other writers and makes no claim to originality. He has used his material legitimately and without making any very serious mistake.

The heat of composition is probably responsible for the confusion of pronouns in the following passage on page 221:

> On his (the Chinese Amban's) way he met Mr. Nicholls, an American, at Ta-chien-lu, the frontie city, where he seems to have spent some time in extracting money from the Chinese prefect and the Tibetan "gyalpo" alike. He seems to have asserted his intention of restoring Chinese authority, and he admitted no sympathy with the Tibetan desire for seclusion, arguing that if Sze-chuan was open to foreigners there could be no reason why the pretensions of the Tibetans should be permitted for a moment. He moved on to Batang for the same dubious purposes that had detained him at Ta-chien-lu.

The grammatical construction of the first sentence makes Mr. Nicholls the extractor of money, but the context shows that throughout the passage *he, his* and *him* are meant for the Amban. Mr. Nicholls is mentioned, as it seems, only to make him report, in a foot-note, that hair and nail-parings of the Dalai Lama were sold at enormous prices in Ta-chien-lu. There is nothing strange in this; the Chinese, like other men, have the craze for amulets and relics.

Ulrich Schmidel. Viaje al Rio de la Plata (1534–1554). Notas Bibliográficas y Biográficas por Bartolomé Mitre. Prólogo, Traducción y Anotaciones por Samuel A. Lafone Quevedo. Buenos Aires, Cabaut y Cía. Editores, Librería del Colegio—Alsina 500, 1903.

The "Junta de Historia y Numismática Americana," on the banks of the La Plata River, has put out the first volume of its "Biblioteca," a Spanish rendering of Huldrich or Ulrich Schmidl, of Straubing, published in German, as is well known, for the first time in 1567 at Frankfort-on-the-Main. The translation from the original German into Spanish is due to Don Samuel A. Lafone Quevedo, also the notes and the prologue, whereas the biographic and bibliographic annotations are from the pen of General Bartolomé Mitre. It is an octavo of 491 pages, printed by Cabaut & Co., at Buenos Aires in 1903, and adorned by a number of illustrations, the execution of which deserves much credit as reproductions of old pictures, of landscapes, actions, Indians, etc., from the Hulsius edition of 1599, including a reputed portrait of Schmidl, several facsimiles of his signature, and three maps—one from Hulsius, "Schifffahrten" (1599), the second from the Map of South America, by Delisle (1700), and the third by Father Jolis in 1789, giving the topography and ethnography of the "Gran Chaco."

It is with great pleasure that we compliment the publishers for the excellent work they have done, typographically and pictorially, making the book a pleasing addition to any library, as far as its output comes into play.

Now to the literary part, introduced to the reader by an 'Advertencia," written

in better taste, that is, with less buncombe than is often the case with South American books of the kind. The bibliographic and biographic notes by Don Bartolomé Mitre follow, and there is much in them that is interesting and even of value. The minute dissertation about the name of Schmidl might have been considerably shortened, for, to any one who is thoroughly acquainted with German names, North, Central, and South, it is a familiar fact that terminations in "el" and "l" are usual in southern German simply as diminutives, and, with children, used in an endearing sense. General Mitre is no Germanist. Neither has he been successful in his parallel between Bernal Diaz del Castillo and Huldreich Schmiedel. That both were soldiers is about all they have in common, and they share this with many, many others, whether writers or not. Of this class, Spanish-American literature has a number of cases, and just us important and valuable ones as either of the two mentioned. Pedro de Cieza (even if he had written but the first and second part of his chronicles), for example, stands on a much higher level, and, as far as we know, he was a soldier, too, at least during the time he spent in South America. The works of the two mentioned are indispensable to students of Spanish-American history, and Schmiedel is more valuable to the geográpher, the naturalist, and the ethnographer than Bernal Diaz, in a certain way, but there is no occasion for placing them apart from, or above, any of the other Spanish writers of note on the early times of discovery and colonization.

The Prologue by Señor Lafone Quevedo relative to the identification of geographic terms, of names and places, and especially of Indian tribes, cannot fail to be of solid value and an important contribution to knowledge. He treats in it of his own country, where he is at home, and on which he has at his command a large literary material. He is, on these matters, entitled to a very respectful hearing. But when we come to his Spanish rendering of the old German text or, probably, of any text in German, we regret to be compelled to apply the Italian proverb: *Traduttore-Traditore.* It would be unpleasant to allude in detail to the glaring proofs, furnished by his translation, of the fact that the German idiom, whether modern or ancient, is to him a book with more than seven seals. We must, however, in order to substantiate our statements allude to a few of his errors: (p. 140), *Feur gemacht* he gratuitously changes into *Feier gemacht*, rendering it by: "and there we rested." How far his ignorance of German has developed is further exemplified, in the same place, by rendering *fire* as synonymous with *azúcar*, or sugar; (p. 158, note I.), Of *Pluetig*, which he correctly translates in the text by *bloody*, he says in his note, "it might be supposed a derivation from *Blau*—blue." Since when has *blood* sprung from *blue*—a colour that has so little to do with it? The expression *blaues Blut* (blue blood), is used in a wholly exceptional sense; to apply it literally will be news to such as have acquired German elsewhere than in Buenos Aires; (p. 182, note 5), It may be asked how *zerprechen*, to break, comes to mean *zarpar*, to sail or leave (applied to a ship), whereas the context itself clearly indicates that the three ships remained there, and only the two others left. More portentous yet is the rendering of *Mit der Zeit* (in the course of time) by *mientras esto*, instead of *con el tiempo*. Still more incomprehensible is the mistake, persistently repeated, of translating *Die Frauen gehenn mit ihrer scham bedeckt* or *Beddeckt mit ihrer scham* by the absolutely contrary: *no se tapan las vergüenzas*. Enough of these lamentable errors, that show how the would-be translator had better have limited himself to annotating and left the translating part to such as know German.

Very valuable is the Appendix, through the number and importance of the documents it contains. In many respects (the translation always excepted) the book is a

great improvement on the version of Ternaux-Compans, who had not at his command the documentation of which the present volume gives such an abundance of rare—nay, of unique—material. A. F. B.

The Story of the Congo Free State: Social, Political and Economic Aspects of the Belgian System of Government in Central Africa. By Henry Wellington Wack. xv and 634 pp., 125 Photographic Reproductions, Maps, Appendix and Index. G. P. Putnam's Sons, New York and London, 1905. (Price, $3.50.)

This volume tells the history of the Congo Free State from its inception, through the periods of formation and development, down to the present time. It is a story worth recording. All students of the African movement know that no other part of barbarous Africa, not even Uganda, has made such progress as the Congo Free State. This is shown by many material facts. Even photographs give abundant evidence. The pictures in this volume of railroads, steamboats, schools, missions, hospitals, orphan asylums, farms, and trade schools where natives are learning carpentry, printing, tailoring, and other forms of skilled labour supply incontrovertible testimony to the transformation in progress.

The author is a lawyer and a student of African affairs. His legal training undoubtedly helped him to write his able analysis of the political relations of the Congo Free State from the Berlin and Brussels Conferences to the present year. He discusses the legal aspects of the founding of the State, the régime which the Berlin Act sought to introduce into the Congo Basin, the principles upon which the Congo system of internal government is based, and questions of frontier and diplomatic settlements. The attention the author has given to African matters also helps him in his treatment of the geography and tribes of the Congo, though he is not a geographer. Mistakes occur, such as the statement that the Aruwimi joins the Congo just below Nyangwe (p. 52). It was not Dr. Junker who discovered the Welle, but Dr. Schweinfurth, and it was Grenfell instead of Van Gèle (p. 53) who revealed the lower Mobangi, and ascended it 400 miles, though it was Van Gèle later who established its identity with the Welle-Makua, and proved it to be the largest Congo tributary. Such inaccuracies are not numerous, and are easily corrected.

It is not within the scope of the *Bulletin* to comment on the accusations brought against the Congo State in England. Four chapters, however, are filled with the testimony of men of world-wide reputation, who say in effect that the recitals of outrages upon the natives and of bad administration are perverted and exaggerated statements; and evidence is adduced that the progress of the State and of the natives under its rule has been remarkable, and that the State is prospering in a greater degree than any other of the African colonies.

The book is in large part the story of this progress, which is, indeed, remarkable when we remember that only twenty-five years ago the Congo region was the darkest part of Africa. At that time the Arab slave-raiders carried on their trade with brutality over the eastern third of the Congo Basin. The Congo Free State brought about the complete suppression of these devastating bands, and there is now no slave-raiding in this vast territory—a third as large as the United States. Cannibalism, human sacrifices, inter-tribal wars, and other great evils have been suppressed in large areas, and before many years will disappear entirely.

Here are some condensed facts that are given *in extenso* in this volume:

Thirteen telephone and telegraph offices are open in the State. The telegraph extends from Boma

up the Congo to Coquilhatville, nearly 750 miles. Another telegraph line 200 miles long connects Kasongo on the Lualaba with Baraka on Lake Tanganyika.

Extensive harbor works have been erected at Banana, Boma, and Matadi. The river channel in the lower Congo is being constantly improved by dredging. The present tonnage into and out of the ports of Banana and Boma is now over 500,000 a year.

A large flotilla of steamboats does excellent service on the upper Congo. The State operates thirty-two of these vessels, the commercial companies about forty-five, and private individuals and missions have smaller steam craft. The tonnage of the upper Congo steamboats is 1,675; the marine service numbers 166 whites and 1,200 blacks. The Government has a fortnightly steamboat service between Leopoldville and Stanley Falls, about 1,000 miles.

The railroad between Matadi and Stanley Pool, 270 miles long, has proved to be one of the most profitable railroads in the world. First-class passage costs $100, and second-class (for natives) $10. Freight rates are also very high. The road has a monopoly of freight carriage between the interior and the Atlantic. As the book was going to press, news was received of some reduction in these charges.

A railroad line is being constructed between Stanleyville and Ponthierville to circumvent the eighty-mile stretch of rapids on this section of the river. The line will be completed this year.

In and far around the numerous Government stations life and property are practically as secure as in any part of Europe or America. A large acreage is being turned by the plough for the growing of coffee, cacao, Assam tea, pepper, cinnamon, and other condiments.

Great expense has been incurred by the State and various companies in the purchase and importation of horses and cattle selected from the best European stocks. The enterprise has proved very successful. These breeding establishments, many of them on the upper Congo, now exceed 70, and there are now in the State 4,500 cattle of European origin, with 60 horses.

The State offers rewards to the natives for the cultivation of coffee and cacao, supplies the necessary seed, and buys all the produce. Coffee flourishes best in the districts of Equateur, Aruwimi, and Stanley Falls. In 1894 the coffee plants amounted to 61,517; in 1902 to 1,996,200.

Caoutchouc is harvested by extracting the fluid from the stem in such a way as to do no injury to the plant. It is a simple operation. The rubber annually exported is about one-sixth of the world's supply. The forests abound with rubber, and the value of the vines thus far planted by the Government and the companies is about $1,000,000.

The Government has prohibited the shooting of elephants to prevent their extinction in the Congo forests. The cutting and export of lumber is regulated by law, as it is intended to preserve the forest areas.

The State discountenances polygamy. No man with more than one wife is eligible for employment either in the military or civil service. Christian marriages between natives take place by thousands every year. Alcoholic liquors are prohibited over nearly the entire area of the State, the sale being limited to 12,500 square kilometers on the lower river.

The export of commodities produced in the State for 1903 amounted to $10,919,567, of which over four-fifths was rubber, the next largest items being ivory and palm nuts. In the same year the imports amounted to $4,179,266, of which Belgium supplied three-fourths.

There are between 200 and 300 white Protestant missionaries, besides native evangelists. The Roman Catholic missions number 384 missionaries and sisters. The missions of the Protestant sects are prosperous and are doing great good, but the solidarity of the Catholic missions has especially favoured their growth. They are maintaining over 500 schools, 113 churches and chapels, 529 farm chapels, 7 hospitals, and there are 71 Christian villages and 72,383 professing Christians enrolled.

Both Protestant and Catholic mission societies maintain many trade schools. Thousands of children are taking courses of instruction in all the common useful arts. The Government also maintains at many of its stations similar courses of manual training. Both boys and girls are quick to learn, and when they complete the course of training they readily find employment in the Government, commercial, or missionary enterprises. In 1890 the Government assumed the guardianship of orphans and forsaken children, who are now provided at various stations with the means of livelihood and a practical education. It is believed that as a result of the wise and broad policy established in the Congo State its black inhabitants will acquire the habit of regular work and attain a degree of civilization that is beyond their reach as long as they remain in a state of primitive idleness.

The map in colours deserves special mention because it is an American product of more than average merit, while exhibiting at the same time some of the defects that make the general cartographic output of our map-houses so inferior to the standard required in most European countries.

Very good material was evidently placed in the hands of the manufacturer, and his engraver made a faithful effort to produce it. Unfortunately, some of this mate-

rial was a little old; and as maps made in our country seem to lack adequate geographic supervision unless it is supplied by the persons ordering the maps, mistakes naturally occur.

The basin of the Kwilu River, north of the Congo, for example, is included within the limits of the Congo Basin, though it is tributary directly to the Atlantic. All the longitudes are given as west of Greenwich, which is regrettable, as the whole of the Congo Free State lies east of Greenwich.

The "proposed" route of the Cape to Cairo R.R. is extended as far north as Lake Tanganyika, though all who know this enterprise are aware that its route has not yet been determined beyond Broken Hill in Northeastern Rhodesia. Four thousand black labourers, under white superintendence, are building the railroad between Stanleyville (called Stanley Falls on the map) and Ponthierville. Upon the completion of this railroad at the end of the present year there will be continuous steam communication for over 1,700 miles up the river. Geographical periodicals have told of this railroad for months past, and three of them have mapped it; but there is no sign of the road on this map specially made to illustrate a book which, by the way, describes the enterprise.

The map has no indication of heights, though many elevations have been ascertained. No rapids are marked in the cataract region of the lower Congo. If figures had been given to show that the difference of elevation between the termini of the railroad around these cataracts is 1,800 feet, the map student would naturally infer that the river is not navigable in that district. Many names mentioned in the book are not given, and a considerable number of Government stations are not indicated. A little competent direction would have improved the map, which has excellent features.

The Republic of Chile. The Growth, Resources, and Industrial Conditions of a Great Nation. By Marie Robinson Wright. 450 pp. and about 275 half-tone Illustrations. George Barrie & Sons, Philadelphia, 1904. (Price, $10.)

A quarto with heavily-weighted pages such as this volume is not to be handled comfortably unless it lies on a table. The publishers have done their part in a sumptuous manner. The book adds nothing to geographical information, but it is a well-told story of one of the most progressive of the Latin republics, from the pen of an experienced writer who spent two years in studying Chile on the ground.

The history, government, and trade of the republic, its cities, social life and beautiful homes, culture, agriculture, mining, and aborigines, from the nitrate fields to Tierra del Fuego, are all depicted with pen and camera. The photographs are beautiful, and show every typical aspect of the country and what the Chileans have done to develop the land and advance civilization. One is surprised to see that a few residences which would adorn the suburbs of New York are to be found at Punta Arenas, on Magellan Strait, the most southern city in the world. Some map-makers who still show Juan Fernandez as a single island might read Mrs. Wright's description of these islands with advantage.

By Nile and Euphrates. A Record of Discovery and Adventure. By H. Valentine Geere. xii and 355 pp., 33 Illustrations, a Map of the Euphrates valley, Glossary, and Index. T. and T. Clark, Edinburgh. Imported by Charles Scribner's Sons, New York, 1904. (Price, $3.50.)

Mr. Geere, a member of the staff of the Babylon expedition sent out by the Uni-

versity of Pennsylvania, first visited Mesopotamia in 1895 to assist in continuing the work of excavating the ruins of the ancient city of Nippur. This book is a record of his observations during that and subsequent labours in this field. He gives many interesting pictures of life and work while in the pursuit of archæological finds, describes the people and country of the Euphrates and Tigris, and sketches some of the out-of-the-way places in that unfrequented region.

Nippur lies midway between the Euphrates and Tigris, and the ancient city owes its importance, Mr. Geere says, chiefly to the fact that its great temple is regarded as the home of Bel, "the Father of the Gods." Dr. Hilprecht has identified the bed of the old Shatt en-Nil, which was one of the principal canals of Babylonia, with that "River Chebar in the land of the Chaldæans" upon whose banks Ezekiel saw his vision of the cherubim. The temple has not yet been cleared, but its boundary wall has been found to enclose a space about 150 feet long by 115 wide. It is expected that the next expedition will ascertain the character of the interior of this important building. On his way to Mesopotamia, Mr. Geere visited Egypt, and he compares the excavations along the Nile with similar work near the Euphrates. The fact that the unexplored mounds of Babylonia and Assyria have by no means received the attention given to archæological enterprises in Egypt is doubtless due to the circumstance that foreigners are sometimes made to feel in the Euphrates region that they are not very welcome, that its climate is not to be compared with that of Egypt, that travelling is neither comfortable nor easy, and that the antiquities of the Nile are more interesting to most men than those of Assyria and Babylonia. The author thinks, however, that, in their intimate association with the history of the Old Testament, Mesopotamia and Chaldæa have strong claims to consideration—greater than they have received. Ur, Nineveh, Babylon, and other sites, it has been proved, hold secrets that well repay excavation; and in his opinion America should not lag behind Germany and France in future researches.

The Lure of the Labrador Wild: The Story of the Exploring Expedition conducted by Leonidas Hubbard, Jr. By Dillon Wallace. 339 pp,, 17 Illustrations and Maps. Fleming H. Revell Company, New York, 1905. (Price, $1,50.)

The book has to do with a pathetic romance of exploration. Mr. Hubbard, 29 years old, a magazine editor of New York who was devoted to out-of-door life and had made several trips into the wilds, formed a plan to explore a part of eastern Labrador from north of the Grand River to Hudson Strait where no white man had preceded him. He invited his friend, Mr. Wallace, to accompany him; a half-breed Cree Indian, an expert canoeman, woodsman, and cook, was the third member of the party. They left New York in the spring of 1903 with an equipment that seemed adequate for so small an expedition. The sad tragedy that followed proved that the party was too small to battle successfully with the swift currents and rapids of the rivers, or to carry sufficient supplies through a country in which all game absolutely failed for weeks at a time.

Mr. Hubbard's plan was to ascend the Grand River to Northwest River Post, traverse Grand Lake, and travel up the Northwest River to Lake Michikamau in 64° W. Long., and then from the north end of the lake strike across the country along the George River to its mouth at Ungava Bay on the south side of Hudson Strait. The course of the upper half of the George River has not yet been mapped.

Mr. Wallace says that the best map of Labrador yet made proved to be incorrect as to the Northwest River. The fact is, however, that no Canadian map has yet

appeared in which an attempt is made to lay down the courses of these rivers north of the explored Grand River. The party got into the Susan River, a hitherto unknown tributary of Grand Lake that headed in mountains far to the east of the lake they were bound for. Terribly travel-worn and half starved, Hubbard finally came within sight of the lake he was seeking; but winter was creeping in prematurely, and it was a chance if the party got back to the coast in safety.

Abandoning the proposed northern journey, the retreat to the coast began; but on October 18 Hubbard could travel no farther, and his comrades left him at his tent and hurried on for succour. Wallace gave out later, and the half-breed pushed forward alone. The rescuers he summoned were in time to save Wallace's life, but Hubbard was found dead in his tent.

Mr. Wallace tells admirably the story of this tragical attempt to penetrate an inhospitable and barren country. We see all the grimness of that wilderness and the terrible obstacles over many of which the little party triumphed. It was a thrilling attempt to bring a considerable area of the unknown to the light, but circumstances were cruelly against the ambitious and too venturesome young man who made it.

The journey was not without geographical result. Five tributaries of Grand Lake are indicated instead of the one stream shown on the maps; and the Susan River, heretofore unknown, was ascended to its fountainhead among mountains no white man had seen before. In Mr. Wallace's opinion it is the Naskopie River that connects Lakes Michikamau and Grand, but further exploration will be needed to settle the hydrography of this region. The illustrations are excellent.

Terre-Neuve, Saint-Pierre et le French-Shore. La question des Pêcheries et le Traité du 8 avril, 1904. Par Robert de Caix. 98 pp. Société Française d'Imprimerie et de Librairie. Paris, 1904.

A study of the fisheries question between France and Great Britain in view of the treaty between those countries made in April last. Written by one of the editors of the *Journal des Débats*, who visited the region in question to obtain data for his work.

L'Ouest Africain et les Missions Catholiques. Congo et Oubanghi. Par G. Renouard. viii and 321 pp., 157 Photographs and 4 Maps and Plans. H. Oudin, Paris, 1904.

The author includes among the influences that determine the success or failure of white enterprises in tropical Africa such local phenomena as the quality of the soil, the nature of rivers and marshes—in a word, the geographic environment. He devotes a large part of his book to geographic descriptions of the southern part of French West Africa and adjoining regions into which the Catholic missions have penetrated, believing that European readers cannot arrive at just conclusions as to what is being done to elevate and develop the natives unless they know what are the physical as well as the moral and intellectual conditions.

So he starts with the beginnings of white influence in the days of the pioneer trader, notes the toils, successes, and blunders of explorers, sums up their discoveries, describes the life of the people, their government, and state of culture. He next describes the European organization and government, shows the progress of the natives under the new régime, and finally gives the history of all phases of the work of the Catholic missions and sums up their results. Like a few other books written

by missionaries who have approached their subject from a similar point of view, this volume is an excellent summary of the geography and the advancement of the regions treated.

La Colonizzazione Agricola dell' Eritrea. Dr. Gino Bartolommei Gioli. 90 pp. Bernardo Seeber, Florence, 1903. (Price, lire 2.)

Two lectures before the R. Accademia dei Georgofili early in 1903. Dr. Gioli, with full faith in the practicability of developing Eritrea, and especially the uplands of the interior, by Italian colonization, treats the colony in relation to public security, hygienic conditions, commerce, customs duties, transportation routes, native agriculture, Italian colonization, and the opportunities for Italian capital and labour.

Die Mission in Unsern Kolonien. Von P. Carl Paul. Drittes Heft: Deutsch-Südwestafrika. iv and 166 pp. Illustrations and Map. C. Ludwig Ungelenk, Dresden, 1905.

An interesting narrative of pioneer missionary work in German Southwest Africa. The writer describes the difficulties that met the pathfinders pushing inland, and the war which the remarkable native chief, Hendrik Witbooi, waged upon the whites. He tells how mission work is begun in the barbarous wilderness, how schools and trades are taught, and describes the hard lot of the missionaries resulting from the recent uprising of the natives. A black map shows the railroads built and projected, military stations, mines, Protestant and Catholic missions, and Government schools.

Pionniers parmi les Ma-Rotse. Par le Missionnaire Adolphe Jalla. 359 pp., 29 illustrations, appendices and a map in colors of the country of the Ma-Rotse. Imprimerie Claudienne, Florence, 1903. (Price, fr. 3.50.)

The record of the life and experiences of Mr. and Mrs. Jalla during their long missionary service in one of the most promising parts of tropical Africa, the basin of the upper Zambezi River. Mr. Jalla has spent over twelve years of his life in this work, which brought him into intimate relations with King Lewanika and all classes of his people. Like many of the most interesting and informing books written by missionaries, this volume is an excellent contribution to our knowledge of the people, their mental attitude towards their neighbours and the whites, their habits and customs, their capacity for improvement and much that pertains to the material development of their country. The appendices give the history of the royal family, discuss questions of polygamy and other social relations among the natives, and include temperature tables prepared from observations extending over eight years. A picture of Lewanika as he appeared in London in a Prince Albert coat and high hat contrasts strikingly with views that other photographers have given of him in his native attire.

Der Kongostaat. Von Dr. Karl Freih. v. Stengel. 55 pp. Carl Haushalter, Munich, 1903. (Price, pf. 75.)

A study of colonial-political development in which the writer, who is a German professor of law, discusses the origin of the colony, the legal rights and powers assigned to it, the legal aspects of the methods of development, the governmental organization, and the influence of the policies in force upon the natives and the development of the colony. He sees important advancement in the condition of the tribes that have come under the influence of the Government.